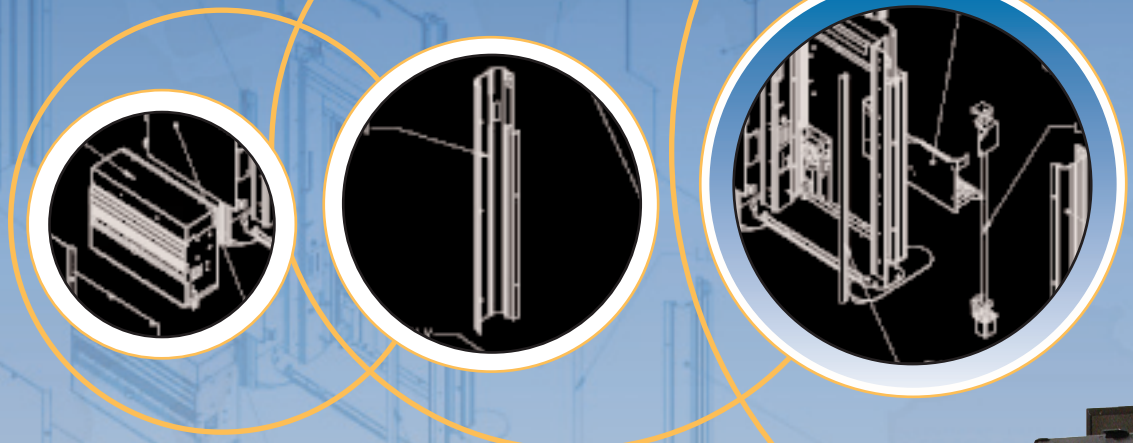
VERTX

SERVICE MANUAL



iCRco

Digital Imaging Made Simple.™

Foreword

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Terms

Any one of the following ***i***CR products will be referred to as the "CR unit" throughout this document: ***i***CR VERTX®.

Contact Information

iCRco., Inc.
Address: 2580 West 237th Street Torrance, CA, 90503
Telephone: 310.921.9559
FAX: 310.776.7960
Email: info@icrcompany.com
Web: www.icrcompany.com

VERTX Information

Please Enter the details of the VERTX system here:

CR Model: _____

Serial Number: _____

Date Purchased: _____

Interface Type: USB 2.0

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1. Safety Information

Be sure to read and understand the installation and operating instructions before applying power to the VERTX unit.

HI POT TEST COMPLETE
BY:
DATE:
US and International Patents Granted
100-240V
DANGER
VISIBLE AND/OR INVISIBLE LASER RADIATION, AVOID DIRECT EXPOSURE TO BEAM
CLASS 3b LASER
900-0054-01
AVOID EXPOSURE VISIBLE and / or INVISIBLE LASER RADIATION IS EMITTED FROM THIS APERTURE
iCRco
The Innovative CR Company
FDA
CE
FDA 510K Cleared
100 - 240 V, 2.3/1.2 A, 50/60HZ
CAUTION: FOR CONTINUED PROTECTION AGAINST RISK OF FIRE, REPLACE ONLY WITH SAME TYPE AND RATING OF FUSE.
FUSE 250VN, T3A

1.1 Notes, Notices, and Cautions

⚠ DANGER: A DANGER indicates that personal injury may occur if the Service person does not perform the procedure correctly.

⚠ WARNING: A WARNING indicates that a user must be constantly aware of something that may prove hazardous.

⚠ CAUTION: A CAUTION indicates that damage to the product may occur if the user does not perform the procedure correctly.

Notice: A NOTICE indicates either potential damage to hardware or loss of data and tells you how to avoid the problem.

Note: A NOTE indicates important information that helps you make better use of your VERTX unit and Software.

1.2 Laser Safety

The VERTX unit incorporates a Class 3B 658 nm Red $\geq$ 15mw high-power solid-state laser diode. The VERTX covers protect the service person from direct exposure to laser light. These covers will protect a user/service person only if they are properly installed.

Covers must be removed and replaced by properly trained service personnel. Contact *i*CRco if there are any issues with the covers being damaged and replace them.

⚠ CAUTION: This equipment employs a laser. Laser radiation may be present if the VERTX unit is operated without covers. Avoid laser beam. Direct eye exposure to laser light must be avoided.

1.3 Electrical Hazards

The equipment must be serviced by properly trained technicians certified by *i*CRco Inc. Do not connect the VERTX unit with a damaged or sub-standard power cable. Do not use an extension cord with this device. The VERTX unit should be properly grounded and power connections inspected to ensure safe operation. Use at least a 1500VA (1500W) uninterruptible power supply (UPS) with this device, as it is sensitive to variations in power.

Notice: The VERTX unit must be connected to a uninterruptible power supply (UPS). Failure to use a (UPS) will void the warranty.

⚠ WARNING: This equipment is operated with hazardous voltages which can shock, burn or cause death.

2. Introduction

2.1 Overview

The VERTX unit is an ultra high resolution Computed Radiography (CR) device. It is designed to scan cassettes containing phosphor screens (CR plates) using patented technology. CR plates are transported past a scanning head without bending or using rollers. This True Flat Scan Path © results in ultra high resolution images with high fidelity across the entire image. High resolution is achieved from the CR plates by coupling the True Flat Scan Path © with a high energy laser.

The VERTX unit collects 16 bits (65,536 possible gray levels) data that is converted to a DICOM 3.0 image and can be stored, viewed, manipulated, and sent to any other storage device, printer, or viewing station through the medical transfer protocol specified by DICOM. This document contains a basic technical overview of the VERTX unit and driving software subsystems. A general description of the systems functionality and user interfaces will be described. Unpacking of the hardware and software installation. This document is intended for users who need to understand the basic principles of operation for the VERTX unit.

2.2 FCC Notification

This equipment generates, uses, and can radiate radio frequency energy, and if not installed properly, can cause interference with radio communications.

2.3 *i*CRco Warranty

iCRco Inc. ("***i***CRco") values your business and always endeavors to provide high quality products and services. All ***i***CRco products are provided with an initial warranty so you are covered from the date you purchase them. This limited warranty solely applies to new products manufactured by or for ***i***CRco and originally purchased from ***i***CRco or an authorized dealer of ***i***CRco products for your own use. In addition, an extended warranty is available for most new and recently purchased ***i***CRco products for an additional charge.

2.4 Hardware Limited Warranty

iCRco warrants its hardware products to be free of defects in materials and workmanship for a period of one (1) year from the date of original shipment from ***i***CRco subject to the limitations set forth herein. ***i***CRco phosphor plates sold with and for use in ***i***CRco cassettes are warranted to be free of defects in materials and workmanship for a period

of (3) years from the date of original shipment subject to limitations set forth herein. If a product proves to be defective in material or workmanship during the warranty period, ***i***CRco will, at its sole option, repair or replace the product with a similar product. Repaired and replacement products may be or include refurbished or remanufactured parts. Any replacement item assumes the remaining warranty period of the original product. ***i***CRco provides no warranty for any third party hardware or software included with any product or later acquired.

2.5 Software Limited Warranty/Support

iCRco warrants that its QPC XSCAN32 software originally provided with any product will substantially conform to ***i***CRco's specifications and that the media, not including hard drives, on which the software is furnished will be free from defects in materials and workmanship under normal use for a period of one (1) year from the date of original shipment from ***i***CRco. ***i***CRco's sole obligation under this warranty is limited to making reasonable efforts to ensure such conformity and to supply the consumer with a corrected version of the software as soon as it is practical after the consumer has notified ***i***CRco of any non conformity. ***i***CRco does not warrant that the operation of any software will be uninterrupted, glitch or error free or that functions contained in the software will operate in the combinations which may be selected for use by the user or meet the user's requirements. This limited software warranty will be void if the software is modified without the written approval of ***i***CRco or is used outside of the recommended parameters or equipment. ***i***CRco does not provide any warranty or support for any other software.

iCRco agrees to provide one (1) year of telephonic and/or e-mail based support for QPC XSCAN32 software originally provided with any new ***i***CRco product from the date of original shipment from ***i***CRco. All software support shall be limited to making reasonable efforts to resolve ***i***CRco software issues and shall be limited to ***i***CRco's regular business hours. In addition, ***i***CRco will provide revisions and upgrades to its software upon request (when available) during the first year after the software was originally shipped from the ***i***CRco factory. The initial support period will include support via remote login software (GoToMeeting), only if the customer has access to the Internet from that PC and only if the customer agrees ***i***CRco shall have no liability in connection with its support efforts. Remote login software allows ***i***CRco technical support to remotely access the customer's PC via the Internet for the purposes of rendering technical support. Please note that this warranty, including software support, does not include computer hardware, third party software or operating system or network issues, which are outside the control of ***i***CRco.

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2.6 Warranty Product Technical Requirements

iCRco requires that all CR, Scanner and/or products requiring PCs be fitted and installed with an uninterruptible power supply (”UPS”). ***i***CRco recommends the 1500VA specification UPS or equivalent. For warranty evaluation and service, ***i***CRco requires the customer to provide a network drop (DSL or Dialup) or the minimum of a phone line accessible by extension cord to the product enabling ***i***CRco technicians to perform remote diagnostics on installed equipment. In addition, each ***i***CRco product must be installed, maintained and operated in accordance with the respective product manual. Failure to comply with these requirements will result in a voided warranty claim.

2.7 Requesting Warranty Service

For information on obtaining warranty service, call ***i***CRco's customer support at (310)921-9559. In order to evaluate a warranty service request, ***i***CRco requires the following information: the ***i***CRco serial number of the product; a detailed description of the problem; customer name and contact information; product location and operating conditions; a copy of the purchase documents; and sufficient information and authorization, including a liability release as to any loss of data (which should always be backed up), software or network injury, or downtime, allowing ***i***CRco technicians remote access to the product. Product may not be returned to ***i***CRco without first obtaining a Return Material Authorization (“RMA”) number from ***i***CRco. Prior to providing an RMA, ***i***CRco may require remote access to the product. If ***i***CRco determines that the product may be defective, is under warranty and necessitates a return to ***i***CRco for service, an RMA number and instructions for return of the product will be given. ***i***CRco is not responsible for any unauthorized returned product, i.e. one for which an RMA number has not been issued by ***i***CRco.

Warranty service requires all authorized returns be shipped to the ***i***CRco factory prepaid and insured. All such authorized returns are the customer's responsibility. For products sold and located within the United States, ***i***CRco will pay for return shipping.

Products being returned are only to be shipped in ***i***CRco approved shipping containers. The original box and packaging materials are approved and should be kept for moving and/or shipping the product. Original and approved packaging my also be purchased from ***i***CRco. ***i***CRco shall have no liability nor responsibility for warranty service to any product that is not shipped in an ***i***CRco approved shipping container or that is damages from incorrect packaging or damage during shipping.

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2.8 Additional Warranty Limitations and Extent of Warranty

This warranty does not apply if the product has been damaged by accident, misused or abused. In addition, warranty service does not include the repair of failures or defects caused by: unauthorized attachments to any ***i***CRco product; unsuitable physical or operating environment, maintenance or repair by anyone other than ***i***CRco or the ***i***CRco authorized dealer that sold the product, operation of a product beyond its duty cycle; use of the product outside of its specifications; the use of supplies, parts, materials, software, or interfaces not furnished, authorized or recommended by ***i***CRco. If the product, including any software has been opened, tampered with, modified or altered in any way without written authorization by ***i***CRco, the warranty will also no longer apply.

This warranty applies only to products manufactured by, or for, ***i***CRco, and that can be identified by "***i***CRco" serial number as originally affixed to the product. Any modification to the ***i***CRco serial number tag or its attachment to the product shall immediately void this warranty.

This warranty is non-transferable and subsequent owners must contact ***i***CRco to establish if the equipment is eligible for an extended warranty.

There are no warranties, express or implied, with respect to any *i*CRco product other than as specifically set forth herein, and *i*CRco specifically disclaims any implied warranties or conditions of merchant ability, fitness for a particular purpose, and satisfactory quality. Any warranties that may not be disclaimed under applicable law are limited in duration to the initial warranty period and no warranties, express or implied, will apply after this period. All information, specifications, prices, and services are subject to change at any time without notice.

2.9 Limitation of Remedies and Liability/Exclusion of Damages

The exclusive remedy for any defective product is limited to the repair or replacement of the defective product. ***i***CRco shall have a reasonable time after determining that a defective product exists to repair or replace a defective product. ***i***CRco's entire liability for any product is limited to the actual purchase price for the product. This limitation applies even if ***i***CRco cannot or does not repair or replace any defective product and your exclusive remedy fails of its essential purpose.

In no event will ***i***CRco be liable for any general, special, consequential or incidental damages, including but not limited to, damages related to the loss of use, loss of recorded product, the installation of replacement product, or any inspection, testing, or redesign

caused by any defect or by the repair or replacement of any product arising from a defect in any product. This exclusion of damages applies even if the customer advises ***i***CRco or an ***i***CRco dealer of the possibility of such damages.

This limitation of remedies also applies to claims against any suppliers or dealers of ***i***CRco. ***i***CRco's and its suppliers' and dealers' limitations of remedies are not cumulative. Such suppliers and dealers are intended beneficiaries of this limitation. ***i***CRco is not liable for any claim by or against the customer arising from a third party claim.

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3. Pre-Installation

3.1 Voltage Requirements

The VERTX unit incorporates an international auto-switching power supply. ***i***CRco employs CE certified medical grade universal power supplies to allow the unit to work between 90 to 253V AC 50/60Hz. In order to run the unit with different power types, apply voltage to the power input module at the end of the VERTX unit. For international units, a local power cord must be used that can handle the power requirements of the unit. A 13A/220V power cord is sufficient.

3.2 Environmental

The VERTX unit should not be placed in a room with a film processor present. This will void the warranty. The humidity and temperature limits are 20 to 95% non-condensing, and 59°F to 95°F (15°C to 35°C), operating, respectively. The room should have good ventilation. Another factor to consider prior to installing the VERTX unit is dust and particulates in the environment. The VERTX unit is designed to be resistant to dust and particulates that may be present at the installation site. This is accomplished by 3 systems that work together to ensure that the unit remains clean.

1. The cooling fan circulates air into the device. There is a filter in front of the fan to ensure that the air in the VERTX unit is clean.
2. The cooling fan ensures that the pressure in the case is slightly higher than the outside pressure, thus dust and dirt do not enter the device through the scan head.
3. All the optics are sealed in the optic cavity, separate from the electronics. Although these systems are in place, in a dusty environment, small amounts of dust and/or dirt may enter the optic cavity. This dust could affect image quality. To prevent this potential issue, it is recommended that the unit be installed and operated in a clean, dry environment.

3.3 Systems Specifications

Cassette Sizes	Pixels per Line Resolution
14x17in, 10x12in (the VERTX uses ***i***CRco digital X-ray cassettes that comply with all standards for conventional X-ray cassettes).	3500 (High Resolution) over 14 inches (356mm) 2048 (Normal Resolution) over 14 inches (356mm).

Scan Rate

Scan Rate 60 lines/second

Grey Scale Resolution

16 bits (65,536 shades of gray)

Interface

USB 2.0

Dimensions

iCR VERTX: 34.9H x 20W x 6.7D inches

Power Requirements

Domestic: 100 to 120V, 50/60Hz, 3.5A
International: 220 to 240V, 50/60Hz, 1.75A

Temperature Conditions

59°F to 95°F (15°C to 35°C) – operating
0°F to 150°F (-18°C to 65°C) – non-operating

Humidity

20 to 95% non-condensing

Vibration/Acceleration

3-4G Max (in shipping)

Altitude

0 to 9,500 ft. - operating

Weight

59 lbs (without accessories)

Warm Up Time

Five (5) minutes.

3.4 Physical requirements

The VERTX unit requires a stable operating environment. It is important the system is placed where it will not be susceptible to tipping over or falling. Please ensure that the base plate is properly installed. Optionally, the VERTX unit can be mounted to the wall or to a mobile cart.

3.5 Connectivity and power supply

The room needs to have wall power and should not be used with an extension cord. Please use at least a 1500VA (1500W) UPS between the wall power and the VERTX unit. It is also required to have a network connection for fast technical support. Alternatively, the user must have a phone/fax line that can be connected to the PC as a minimum to comply with ***i***CRco warranty terms.

4. Packing List

⚠ WARNING: The UPS *CAN NOT* ship with the battery connected. Upon unpacking the VERTX and its accessories, the UPS will need to have the battery reconnected.

Box 1: Scanning

1. (1) VERTX Scanner with AC cord attached
2. (1) USB 2.0 cable
3. (1) Suspension Mounting Kit

Box 2: Accessories A

1. (4) 14 x 17″ Cassette
2. (4) 10 x 12″ Cassette
3. (1) 14 x 17″ Grid Cap
4. (1) 10 x 12″ Grid Cap
5. (2) Panasonic Toughbook CF-52 Laptops and (2) AC adapters
6. (1) EZCR din Test Tool

Box 3: Accessories B

1. (1) APC 1300 UPS
2. (1) 19″ FIME 2MP Monitor & (1) USB cable & (1) Power Cord
3. (1) Network Switch & (1) Network Switch Power Supply
4. (1) 100ft CAT-5 Cable
5. (1) 15ft CAT-5 cable
6. (1) External Hard Drive & (1) AC Adapter and (1) USB Cable
7. (4) 100 CD spindles and (4) CD Envelopes

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5. Unpacking / Setup Instructions

1. Remove the Uninteruptable Power Supply (UPS) from the box.
2. Make sure to connect the red wire to the battery terminal (remove the bottom panel from the UPS and plug the red wire into the battery terminal).
3. Plug the UPS into a stable, standard 120 AC power outlet.
4. Remove the VERTX from the box.
5. Plug the VERTX into the UPS battery backup (the bottom set of outlets on the UPS).
6. Remove the Acquisition Toughbook (the one with two strips of Velcro on the bottom) and AC adapter from the box.
7. Plug one end of the AC adapter into the Toughbook and the other end into UPS surge protector outlet (the Toughbook has its own battery backup).
8. Connect one end of the USB cable into the VERTX USB plug and the other end into the Acquisition Toughbook USB port.
9. Remove the Viewing Toughbook and AC adapter from the box.
10. Plug one end of the AC adapter into the Toughbook and the other end into UPS surge protector outlet.
11. Remove the external hi-resolution display and AC adapter from the box.
12. Plug the AC adapter into a standard AC power outlet.
13. Plug the USB cable into a USB port on the Viewing Toughbook.
14. Remove the network switch, AC adapter and two Ethernet cables from the box.
15. Plug one end of the AC adapter into a standard AC power outlet and the other end into the network switch.
16. Plug the 100 foot Ethernet cable into the Ethernet port on the back of the Acquisition Toughbook, then plug the other end of the Ethernet cable into port 1 of the network switch.
17. Plug the 15 foot Ethernet cable into the Ethernet port on the back of the Viewing Toughbook, then plug the other end of the Ethernet cable into port 2 of the network switch.
18. Turn ON the UPS, both Toughbooks, the external hi-resolution monitor, and the VERTX unit (there is no switch for network switch).
19. Verify everything is ON and working.

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6. Driver and Software Installation

The computer hardware necessary to interface with the VERTX is shipped to the customer with all needed drivers and software installed. If the need arises, the following section describes how to install the software.

The "standard" military deployment consists of the following software components: **Drivers**: ***i***CR VERTX (installed when QPC XSCAN is installed), Ampronix external USB display, external hard drive DiskGo HD. **Software**: QPC XSCAN.

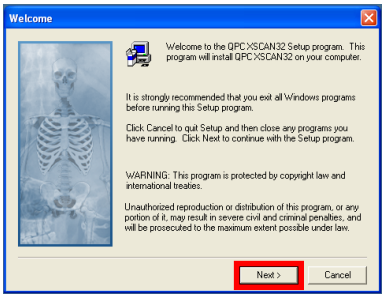
6.1 Installing USB drivers

USB drivers are automatically installed while installing QPC XSCAN32.

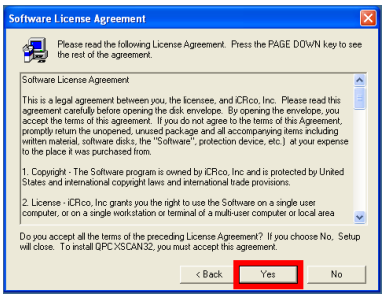
6.2 Installing QPC XSCAN32

QPC XSCAN32 software comes bundled with the VERTX unit. This software package will allow the user to interface with the VERTX unit.
Note: If you have QPC XSCAN32 already installed on your computer and it is running while you are trying to install the new version, an error will appear in the install process. Please close QPC XSCAN32 and reinstall the new version.

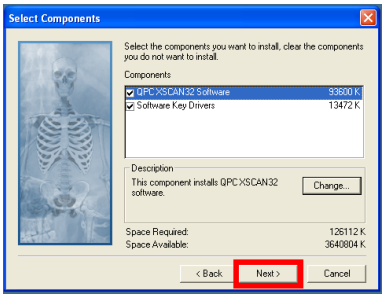
1. Insert the media containing the QPC XSCAN32 installer into the computer. Navigate to the *QPC XSCAN32* folder.
2. Launch the QPC XSCAN32 installer by double clicking **Setup.exe**.
3. Click **Next** at the welcome screen.


Welcome
Welcome to the QPC XSCAN32 Setup program. This program will install QPC XSCAN32 on your computer.
It is strongly recommended that you exit all Windows programs before running this Setup program.
Click Cancel to quit Setup and then close any programs you have running. Click Next to continue with the Setup program.
WARNING: This program is protected by copyright law and international treaties.
Unauthorized reproduction or distribution of this program, or any portion of it, may result in severe civil and criminal penalties, and will be prosecuted to the maximum extent possible under law.
Next >
Cancel

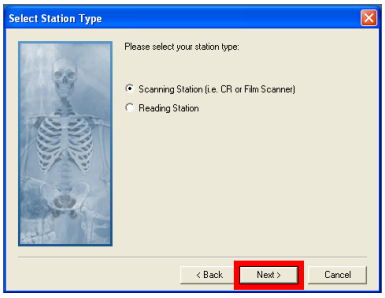
4. Click **Yes** to agree to the Software License Agreement.


Software License Agreement
Please read the following License Agreement. Press the PAGE DOWN key to see the rest of the agreement.
Software License Agreement
This is a legal agreement between you, the licensee, and iCRco, Inc. Please read this agreement carefully before opening the disk envelope. By opening the envelope, you accept the terms of this agreement. If you do not agree to the terms of this Agreement, promptly return the unopened, unused package and all accompanying items including written material, software disks, the "Software", protection device, etc.) at your expense to the place it was purchased from.
1. Copyright - The Software program is owned by iCRco, Inc and is protected by United States and international copyright laws and international trade provisions.
2. License - iCRco, Inc grants you the right to use the Software on a single user computer, or on a single workstation or terminal of a multi-user computer or local area
Do you accept all the terms of the preceding License Agreement? If you choose No, Setup will close. To install QPC XSCAN32, you must accept this agreement.
< Back
Yes
No

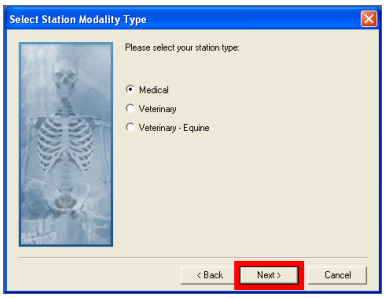
5. Make sure both *QPC XSCAN32 Software* and *Software Key Driver* boxes are checked, then click **Next**.


Select Components
Select the components you want to install, clear the components you do not want to install.
Components
QPC XSCAN32 Software 93600 K
Software Key Drivers 13472 K
Description
This component installs QPC XSCAN32 software.
Change...
Space Required: 126112 K
Space Available: 3640804 K
< Back
Next >
Cancel

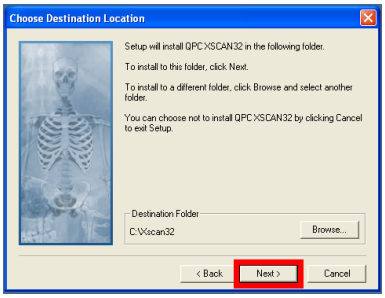
6. Select *Scanning Station* or *Reading Station* depend on the use, then click **Next** to continue.



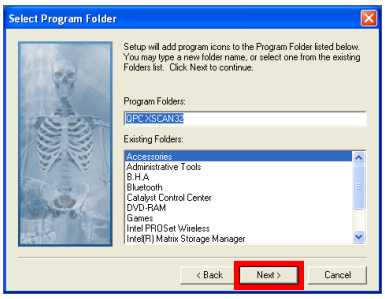
7. Select the appropriate modality, then click **Next** to continue.



8. The Destination Folder should be set to `C:\Xscan32` then click **Next** to continue.


Choose Destination Location
Setup will install QPC XSCAN32 in the following folder.
To install to this folder, click Next.
To install to a different folder, click Browse and select another folder.
You can choose not to install QPC XSCAN32 by clicking Cancel to exit Setup.
Destination Folder
C:\Xscan32
Browse...
< Back
Next >
Cancel

9. The Program Folder name should be set to *QPC XSCAN32*, then click **Next**.



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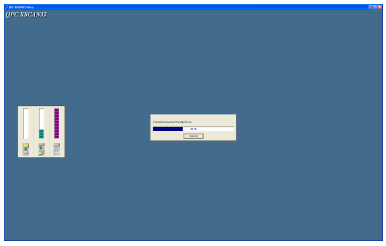
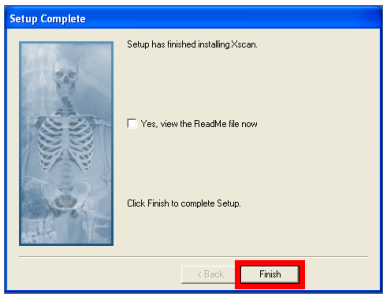
10. QPC XSCAN32 will begin to install. Be patient while XSCAN32 installs.



11. Click **Finish** to complete the installation of QPC XSCAN32. The installer will exit.



6.3 Initializing the VERTX Driver

Note: This process will need to be repeated for each USB port on the laptop. There are 4 USB ports on each laptop.

1. Make sure the VERTX unit is powered on and has the proper USB cable installed.
2. Plug the USB cable into the laptop.
3. The New Hardware Wizard dialog will pop up. Select the option *Install the software automatically*, then click **Next**.

Found New Hardware Wizard
Welcome to the Found New Hardware Wizard
This wizard helps you install software for:
iCR VertX USB Interface
If your hardware came with an installation CD or floppy disk, insert it now.
What do you want the wizard to do?
Install the software automatically (Recommended)
Install from a list or specific location (Advanced)
Click Next to continue.
< Back
Next >
Cancel

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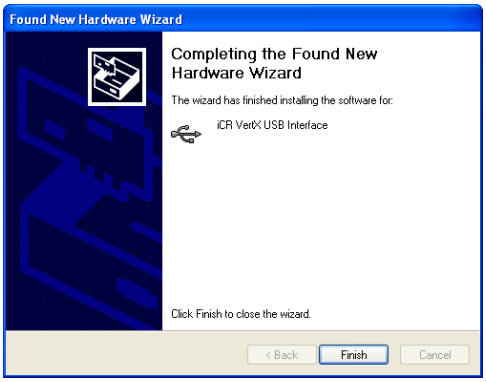
4. A driver signing warning will appear. Click **Continue Anyway**.

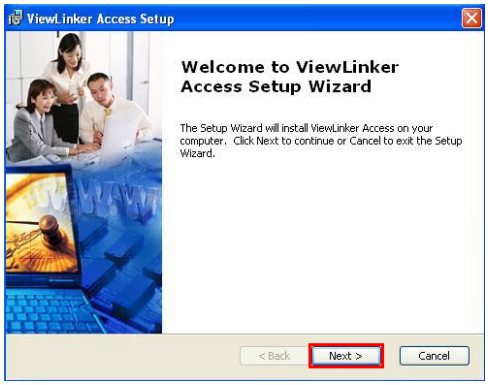
Hardware Installation
The software you are installing for this hardware:
iCR VertX USB Interface
has not passed Windows Logo testing to verify its compatibility with Windows XP. (Tell me why this testing is important.)
Continuing your installation of this software may impair or destabilize the correct operation of your system either immediately or in the future. Microsoft strongly recommends that you stop this installation now and contact the hardware vendor for software that has passed Windows Logo testing.
Continue Anyway
STOP Installation

5. The installation process is finished. Click **Finish** to finish the installation.

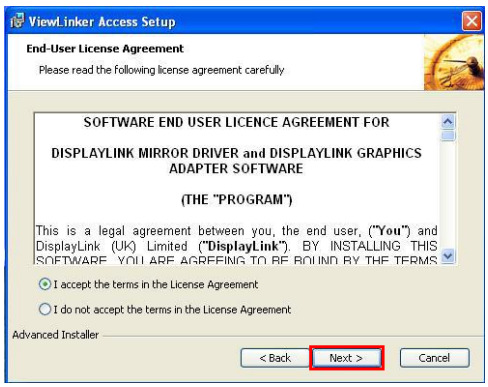

Found New Hardware Wizard
Completing the Found New Hardware Wizard
The wizard has finished installing the software for:
iCR VertX USB Interface
Click Finish to close the wizard.
< Back
Finish
Cancel

6.4 Installing Ampronix External Monitor Drivers

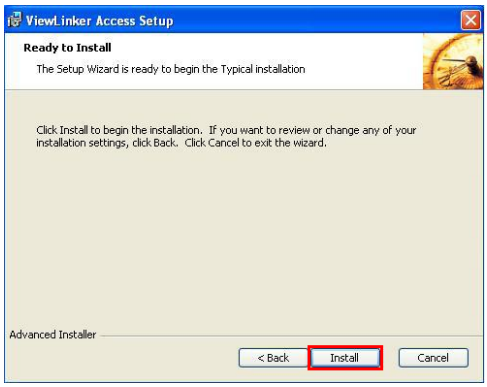
1. Insert the installation media into the computer.
2. Double click the **Setup.exe** file.
3. The Welcome screen will appear. Click **Next**.


ViewLinker Access Setup
Welcome to ViewLinker Access Setup Wizard
The Setup Wizard will install ViewLinker Access on your computer. Click Next to continue or Cancel to exit the Setup Wizard.
< Back
Next >
Cancel

4. At the license agreement screen, select the radio dialog box next to *I accept the terms in the License Agreement*, then click **Next**.


ViewLinker Access Setup
End-User License Agreement
Please read the following license agreement carefully
SOFTWARE END USER LICENCE AGREEMENT FOR
DISPLAYLINK MIRROR DRIVER and DISPLAYLINK GRAPHICS ADAPTER SOFTWARE
(THE "PROGRAM")
This is a legal agreement between you, the end user, ("You") and DisplayLink (UK) Limited ("DisplayLink"). BY INSTALLING THIS
I accept the terms in the License Agreement
I do not accept the terms in the License Agreement
Advanced Installer
< Back
Next >
Cancel

5. Click **Install** to begin the installation.

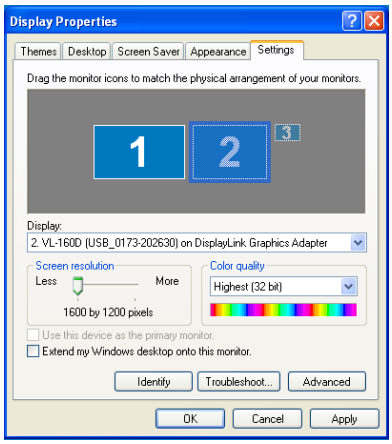

ViewLinker Access Setup
Ready to Install
The Setup Wizard is ready to begin the Typical installation
Click Install to begin the installation. If you want to review or change any of your installation settings, click Back. Click Cancel to exit the wizard.
Advanced Installer
< Back
Install
Cancel

6. Click **Finish** to complete the installation.

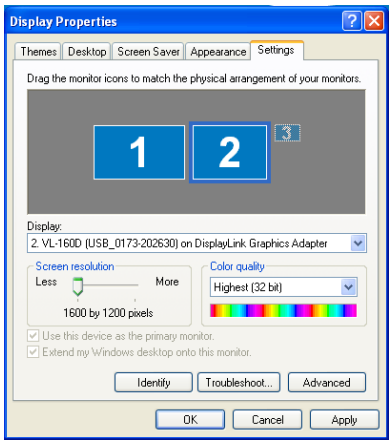
7. The user may need to reboot the computer for the installation to be completed.

6.5 Monitor Configuration

1. Ensure that the external monitor is powered on and is connected to the laptop via the USB cable.
2. Go to *Start* → *Control Panel* → *Display*.
3. In the *Display Properties*, click on the **Settings** tab.
4. In the Settings tab, select the display *VL-160D* – this is the external monitor.



5. Check the box, *Extend my Windows desktop onto this monitor*.
6. Check the box *Use this device as the primary monitor*.



7. Click Apply.

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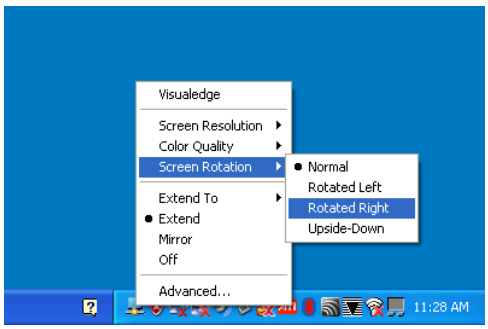
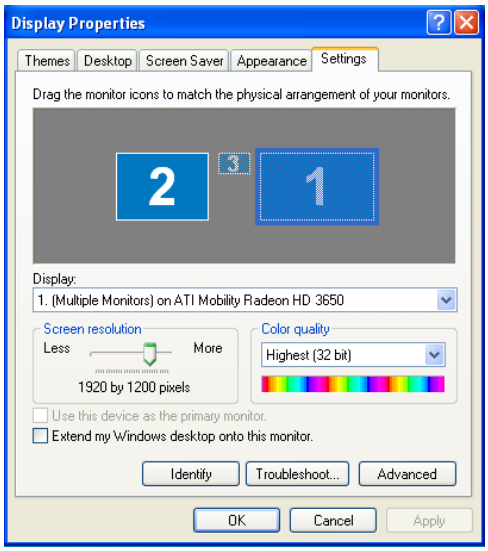
8. To rotate the external monitor to portrait mode, right click on the monitor icon in the system tray, then select *Screen Rotation*, then click *Rotated Right*.



9. Select Monitor 1, then uncheck *Extend my Windows desktop onto this monitor*.

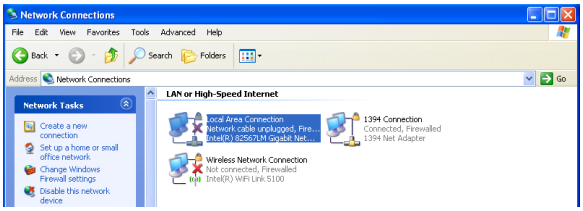


10. Click Apply.

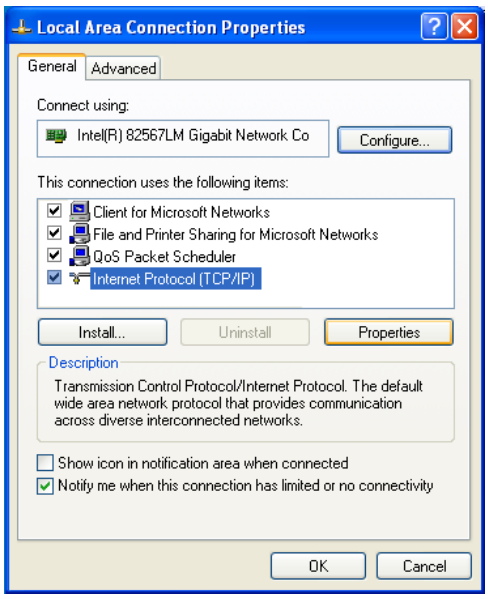
11. This will turn off the laptop monitor, leaving the external monitor as the main, functioning screen.

6.6 Network Configuration

1. Go to *Start* → *Control Panel* → *Network Connections*, then double click **Local Area Connection**.



2. Select *Internet Protocol (TCP/IP)*, then click **Properties**.



3. Select the check box *Use the following IP address*.

4. If the laptop is an Acquisition station, enter the following:
   IP Address: 192.168.0.1
   Subnet Mask: 255.255.255.0
   Default Gateway: 192.168.0.1

   If the laptop is a Viewing station, enter the following:
   IP Address: 192.168.0.2
   Subnet Mask: 255.255.255.0
   Default Gateway: 192.168.0.1

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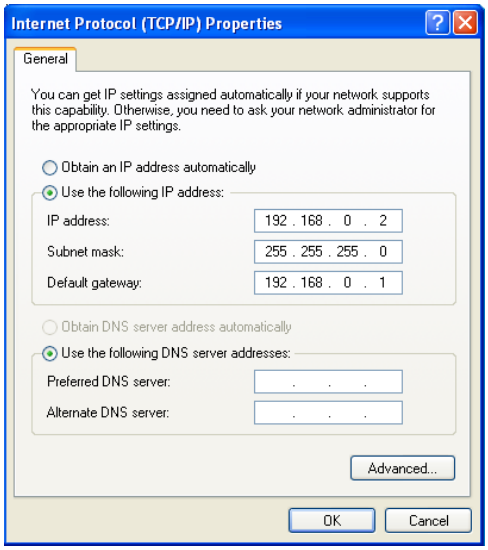
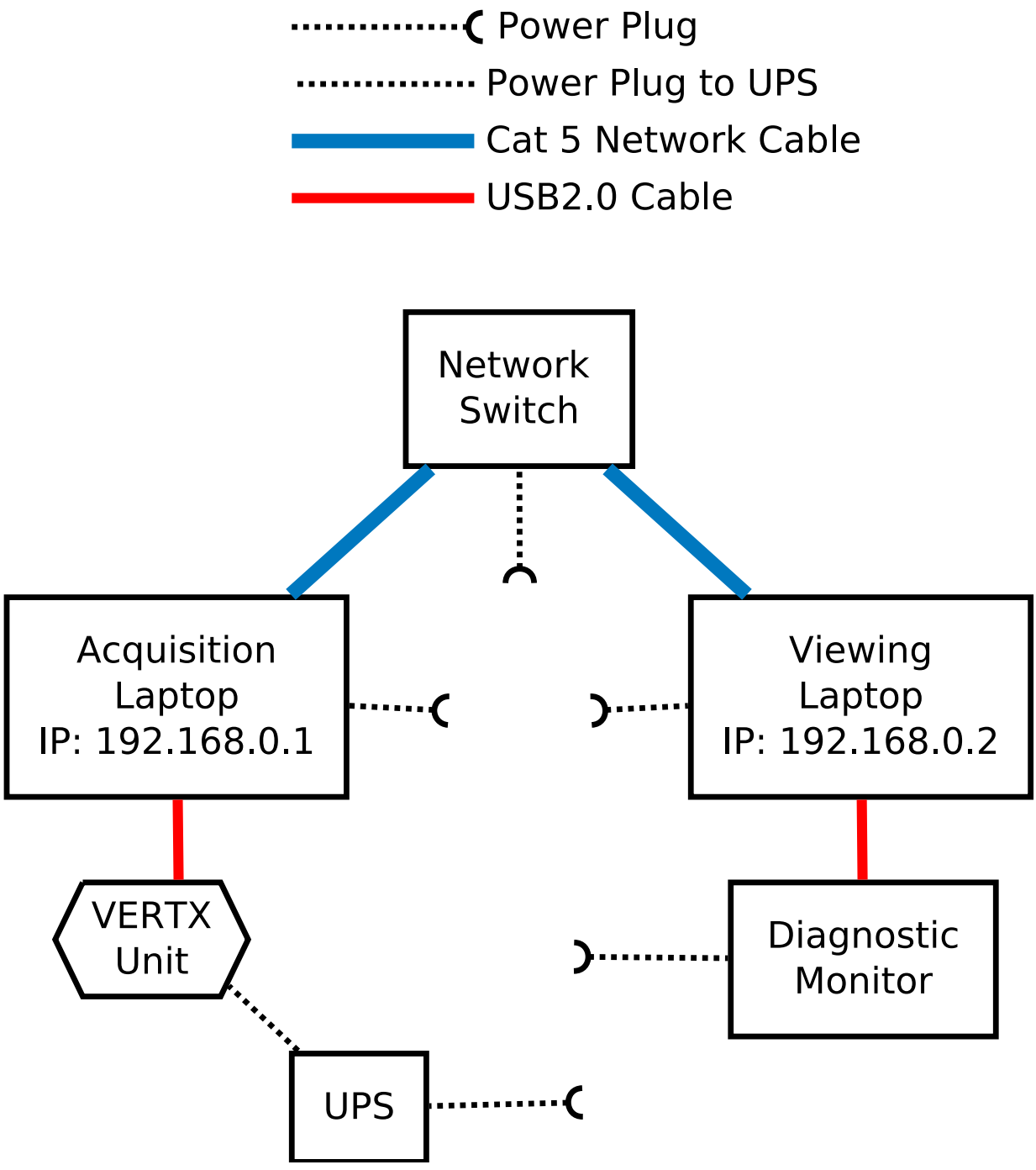

Internet Protocol (TCP/IP) Properties
General
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.
Obtain an IP address automatically
Use the following IP address:
IP address: 192 . 168 . 0 . 2
Subnet mask: 255 . 255 . 255 . 0
Default gateway: 192 . 168 . 0 . 1
Obtain DNS server address automatically
Use the following DNS server addresses:
Preferred DNS server:
Alternate DNS server:
Advanced...
OK
Cancel

5. Click **OK**.

7. Hardware Installation

7.1 Hardware Setup Diagram



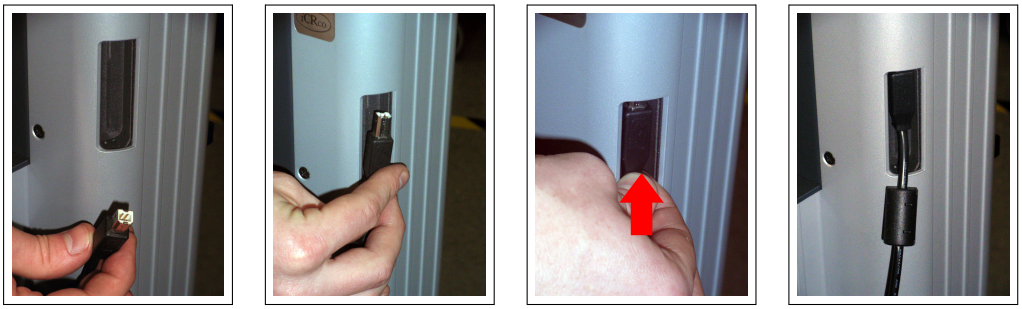
7.2 PC Specifications

The minimum requirements for the Acquisition computer are as follows:

Processor: Pentium D
RAM: 2 GB or more
OS: Windows XP
HDD: 250 GB or more

7.3 VERTX USB 2.0 Installation

The USB 2.0 port is located on the upper, right-hand side of the operator when facing the front of the VERTX unit. Plug a standard USB 2.0 cable into the VERTX USB port and then into the PC.



7.4 Power Switch Locations

The power switch for the VERTX unit is located on the front in the lower right hand side of the unit, shown here with the front cowling removed.

7.5 Installing AC Power Cord

1. Remove two (2) 8-32 x $1\frac{1}{2}$" flathead screws from the front power cowling.

2. Plug the other end of the power switch cord into the UPS battery back-up outlet.
3. Replace two (2) 8-32 x $1\frac{1}{2}$" flathead screws into the front power cowling.
4. Plug the male end of the power switch cord into the battery backup portion of the UPS.
5. Make sure the battery in the UPS is connected. If it is not connected, the UPS will beep intermittently.
6. Turn the VERTX unit switch to the on position.

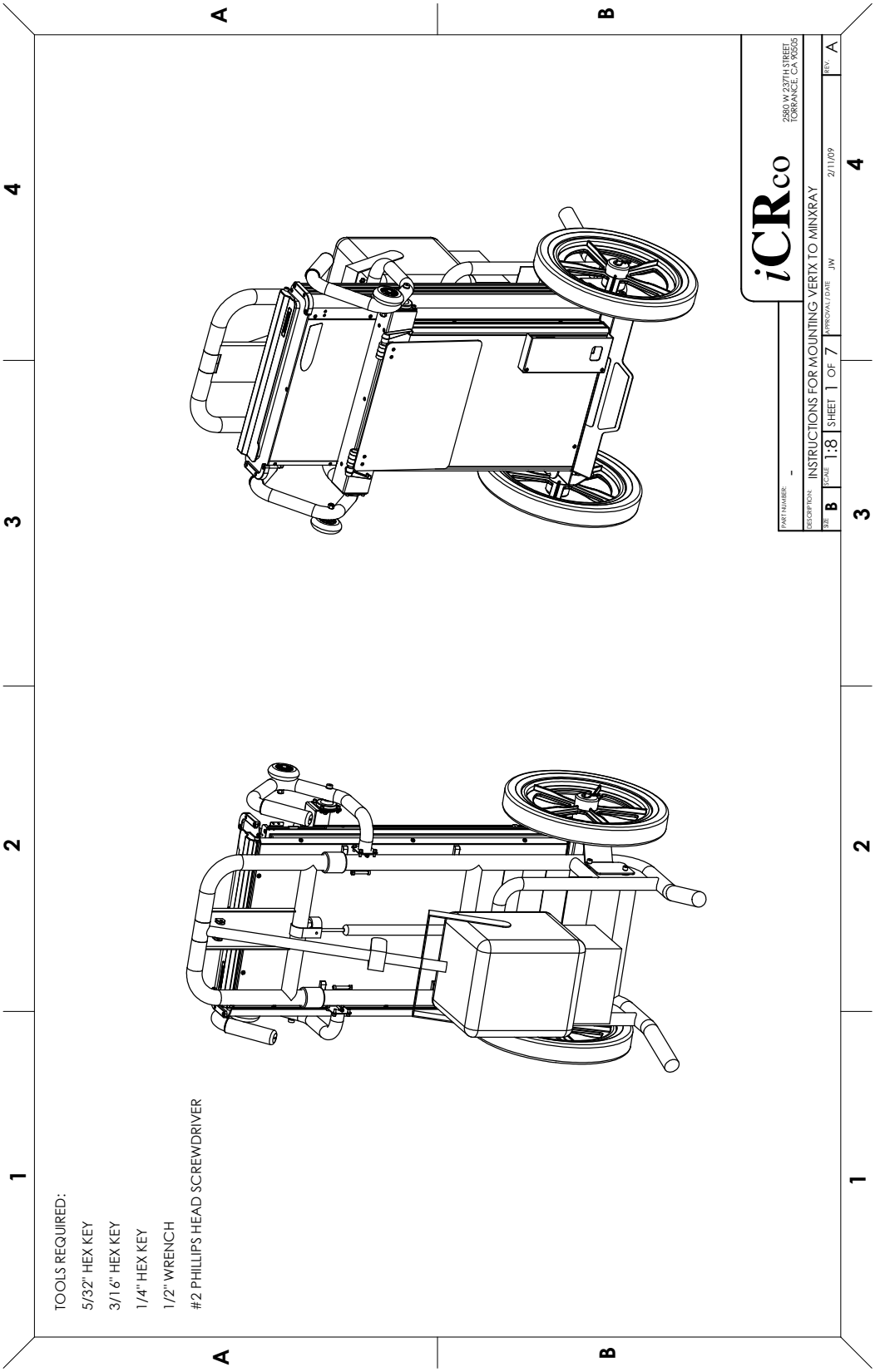
7.6 International Power Cable

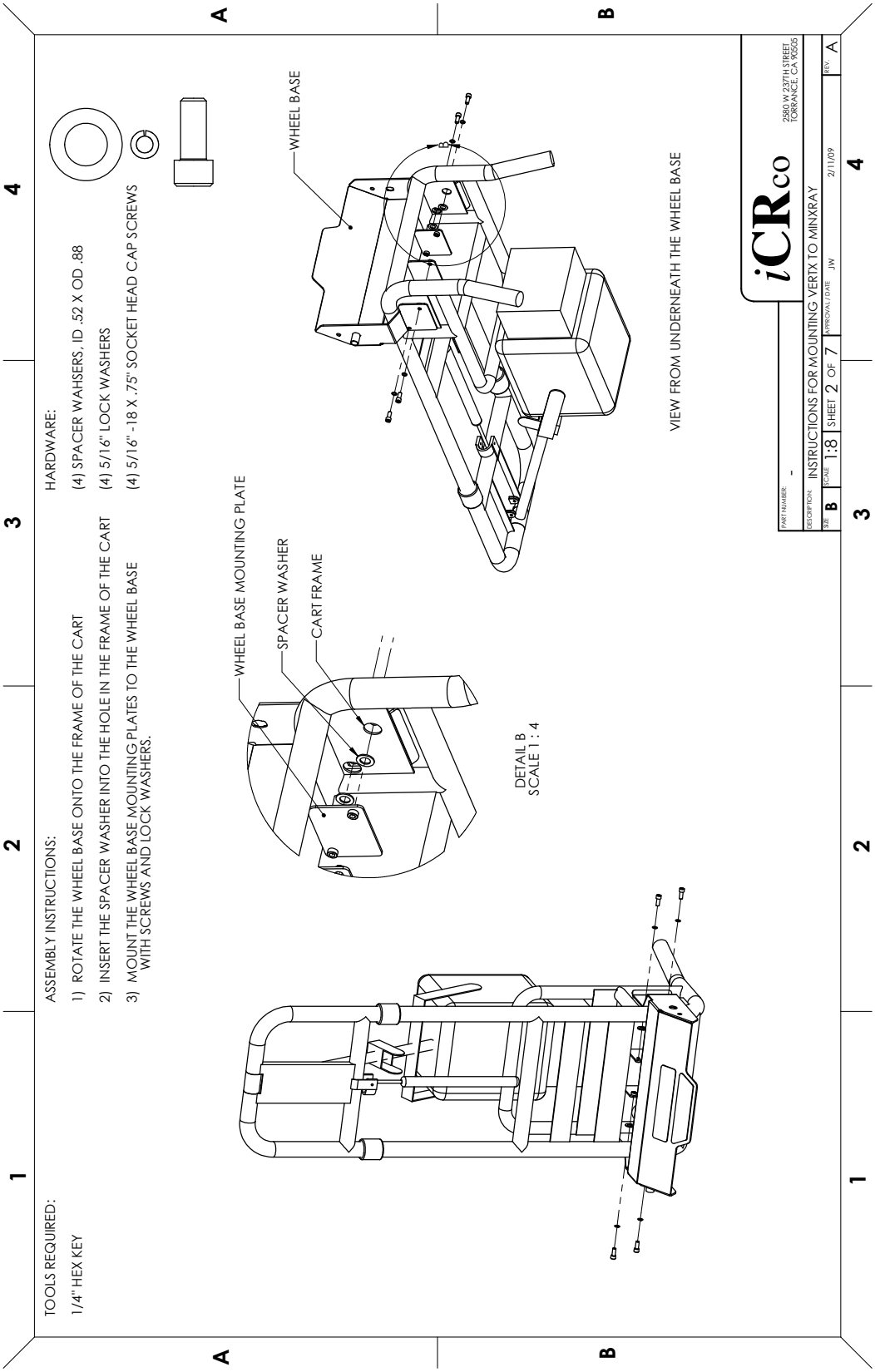
The VERTX unit utilizes an international IEC grade connector for the power cable. Systems are shipped with a standard NEMA 5-15 hospital grade cable. The cable needs to be changed depending on the male end, which varies from country to country.

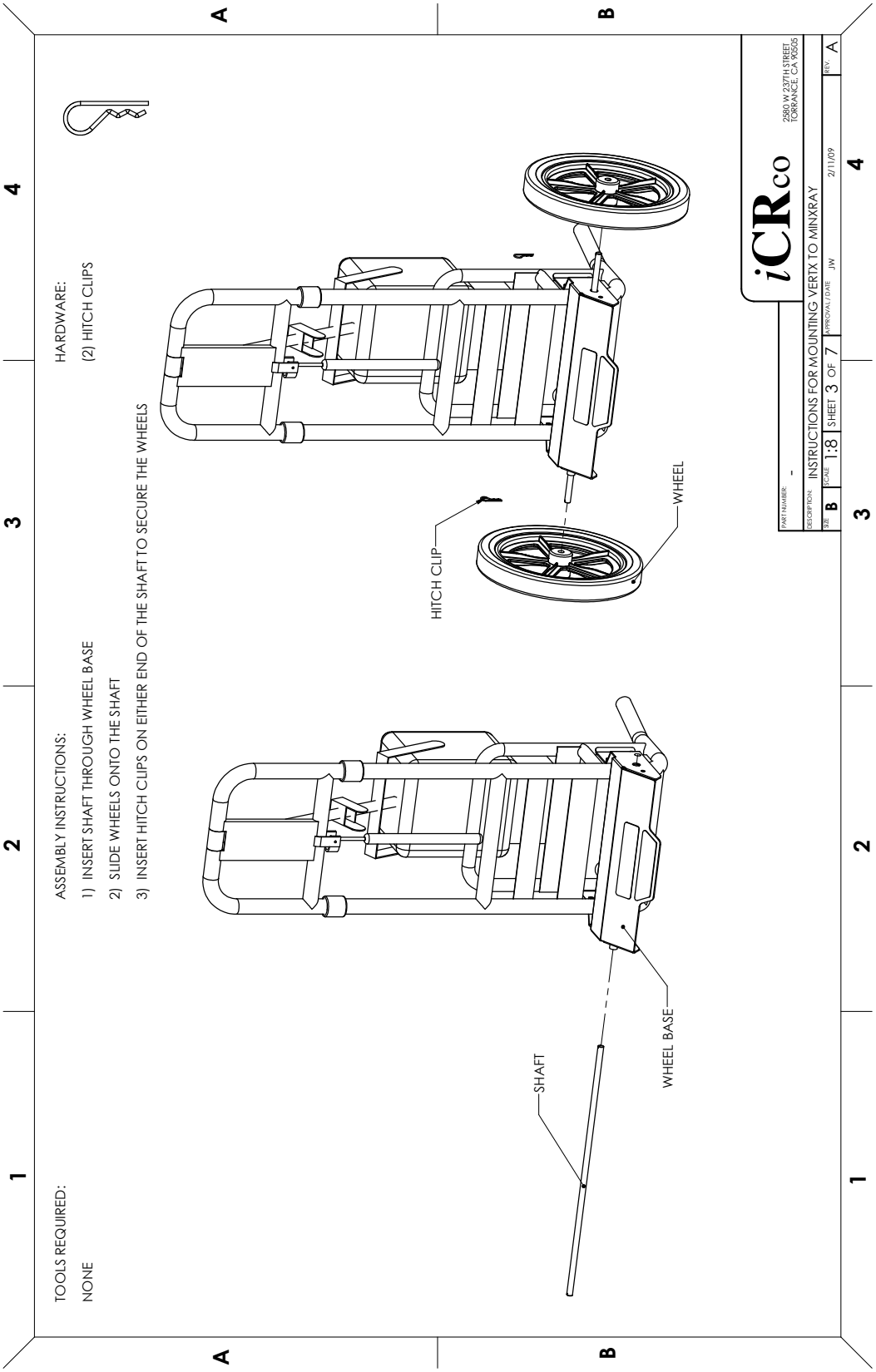
7.7 Power and Scan Lights

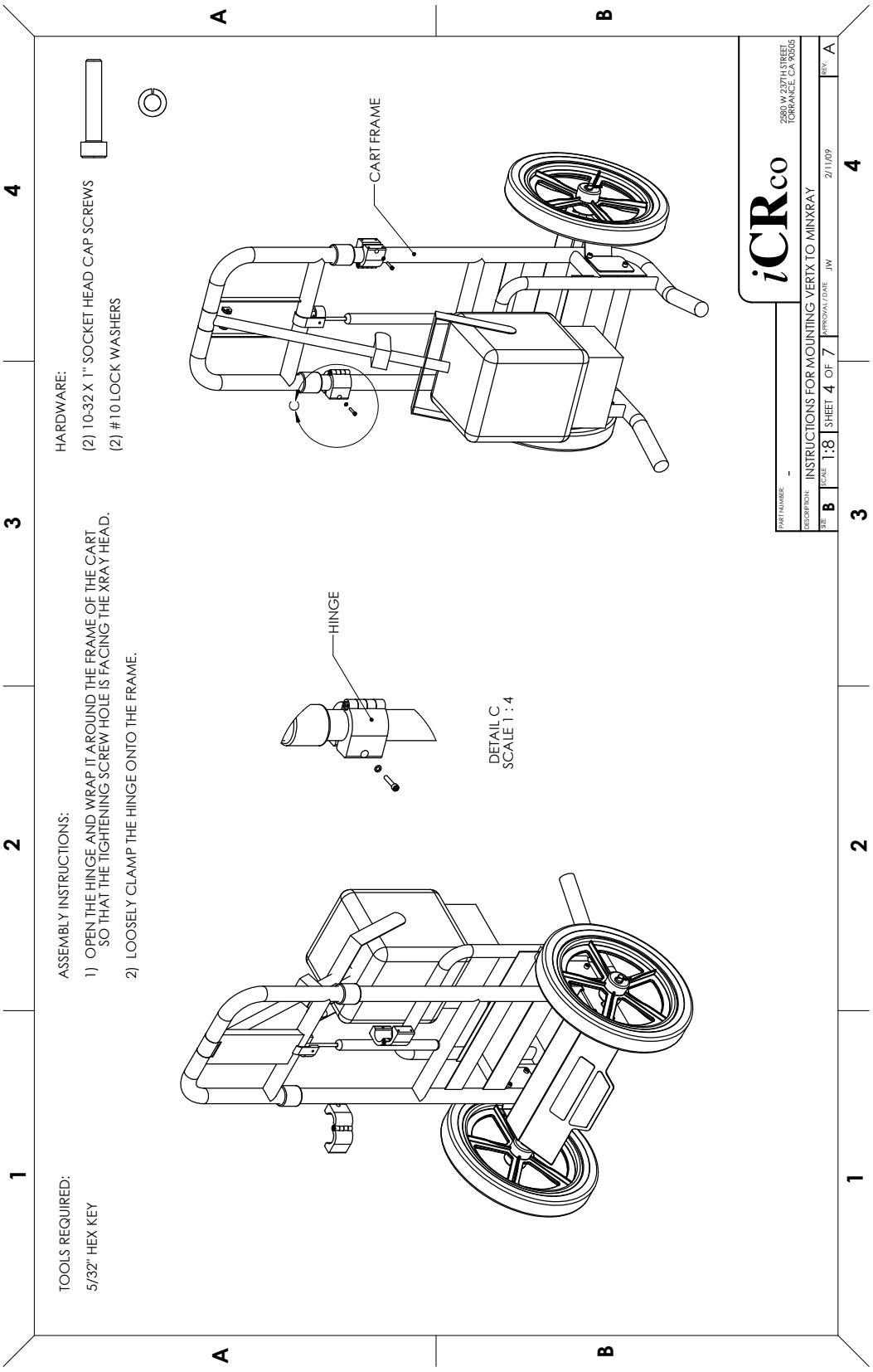
The power and scan lights are located in the front of the VERTX unit near the top right side. When the unit is powered on, the green light is illuminated. While the unit is scanning the yellow light will blink.

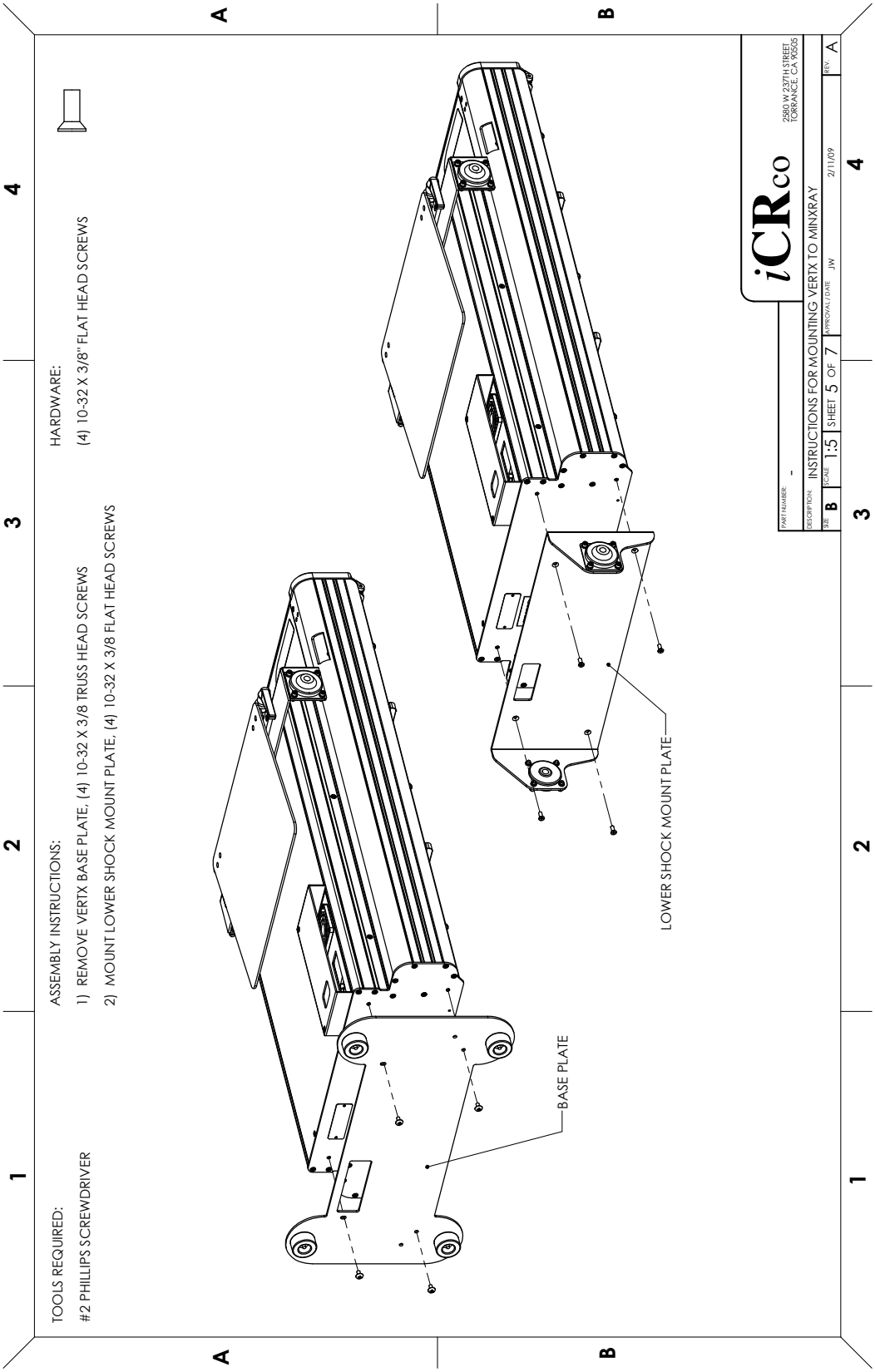
7.8 Cart Mounting Instructions

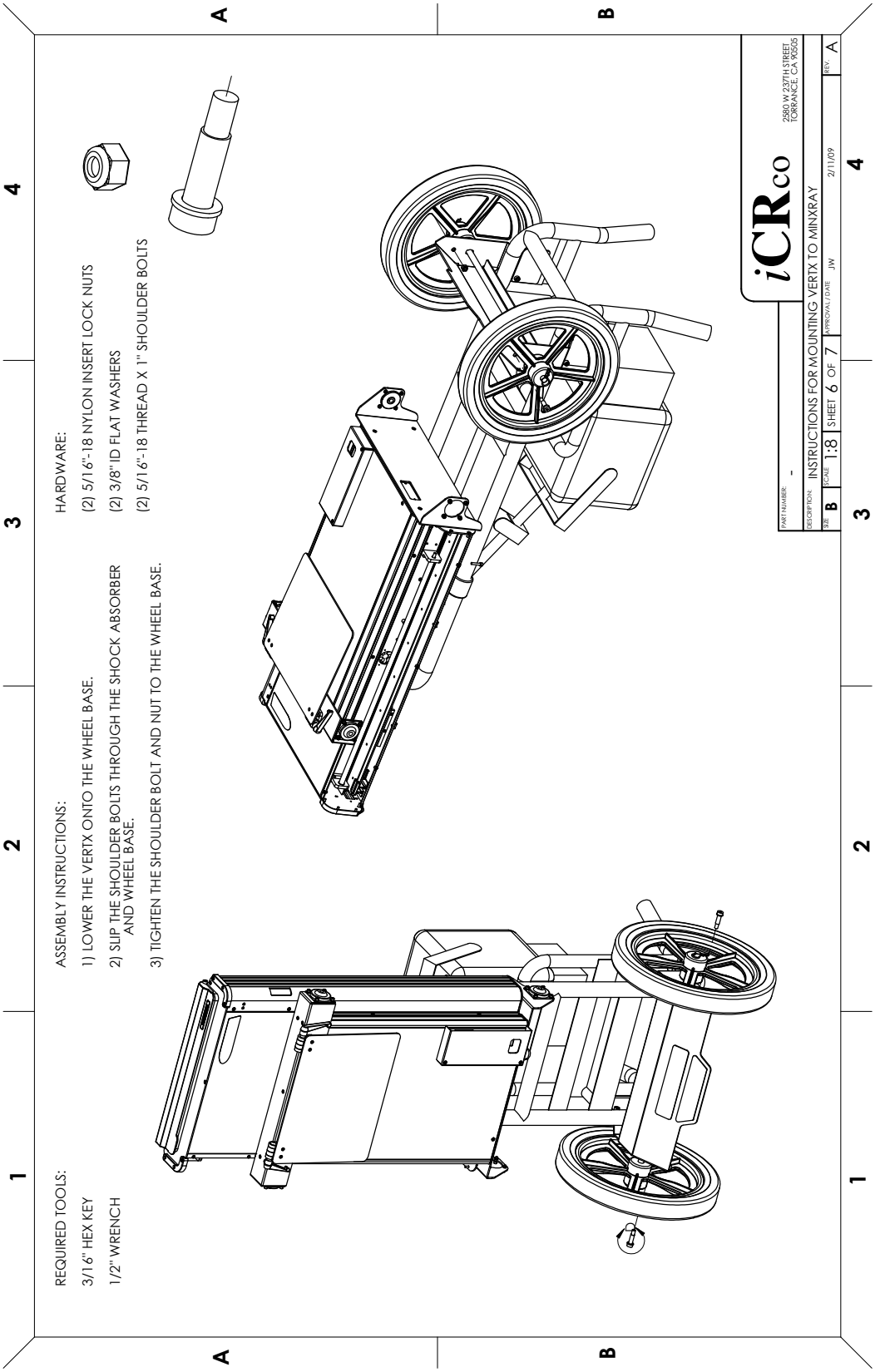

A
B
1
2
3
4
iCRco
2380 W 237TH STREET
TORRANCE, CA 90505
PART NUMBER: -
DESCRIPTION: INSTRUCTIONS FOR MOUNTING VERTX TO MINIXRAY
SIZE B
SCALE 1:8
SHEET 1 OF 7
APPROVAL / DATE JW 2/11/09
REV A
TOOLS REQUIRED:
5/32" HEX KEY
3/16" HEX KEY
1/4" HEX KEY
1/2" WRENCH
#2 PHILLIPS HEAD SCREWDRIVER

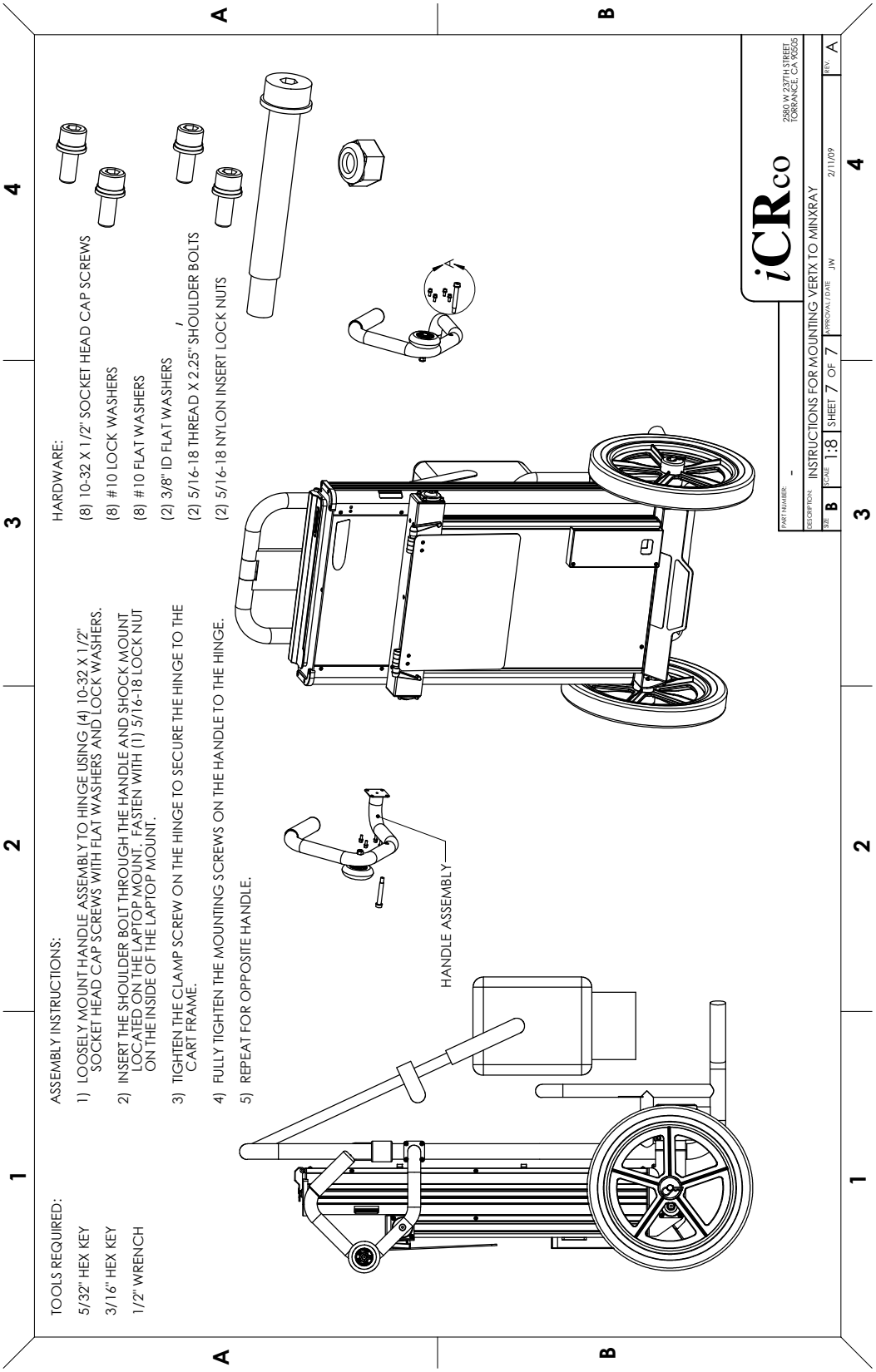

TOOLS REQUIRED:
1/4" HEX KEY
ASSEMBLY INSTRUCTIONS:
1) ROTATE THE WHEEL BASE ONTO THE FRAME OF THE CART
2) INSERT THE SPACER WASHER INTO THE HOLE IN THE FRAME OF THE CART
3) MOUNT THE WHEEL BASE MOUNTING PLATES TO THE WHEEL BASE WITH SCREWS AND LOCK WASHERS.
HARDWARE:
(4) SPACER WAHSERS, ID .52 X OD .88
(4) 5/16" LOCK WASHERS
(4) 5/16" -18 X .75" SOCKET HEAD CAP SCREWS
WHEEL BASE
WHEEL BASE MOUNTING PLATE
SPACER WASHER
CART FRAME
DETAIL B
SCALE 1 : 4
VIEW FROM UNDERNEATH THE WHEEL BASE
iCRco
2380 W 237TH STREET
TORRANCE, CA 90505
PART NUMBER: -
DESCRIPTION: INSTRUCTIONS FOR MOUNTING VERTX TO MINXRAY
SIZE B
SCALE 1:8
SHEET 2 OF 7
APPROVAL / DATE JW 2/11/09
REV A


TOOLS REQUIRED:
NONE
ASSEMBLY INSTRUCTIONS:
1) INSERT SHAFT THROUGH WHEEL BASE
2) SLIDE WHEELS ONTO THE SHAFT
3) INSERT HITCH CLIPS ON EITHER END OF THE SHAFT TO SECURE THE WHEELS
HARDWARE:
(2) HITCH CLIPS
HITCH CLIP
WHEEL
SHAFT
WHEEL BASE
iCRco
2380 W 237TH STREET
TORRANCE, CA 90505
PART NUMBER: -
DESCRIPTION: INSTRUCTIONS FOR MOUNTING VERTX TO MINXRAY
SIZE B
SCALE 1:8
SHEET 3 OF 7
APPROVAL / DATE JW 2/11/09
REV A


TOOLS REQUIRED:
5/32" HEX KEY
ASSEMBLY INSTRUCTIONS:
1) OPEN THE HINGE AND WRAP IT AROUND THE FRAME OF THE CART SO THAT THE TIGHTENING SCREW HOLE IS FACING THE XRAY HEAD.
2) LOOSELY CLAMP THE HINGE ONTO THE FRAME.
HARDWARE:
(2) 10-32 X 1" SOCKET HEAD CAP SCREWS
(2) #10 LOCK WASHERS
CART FRAME
HINGE
DETAIL C
SCALE 1 : 4
iCRco
2580 W 237TH STREET
TORRANCE, CA 90505
PART NUMBER: -
DESCRIPTION: INSTRUCTIONS FOR MOUNTING VERTX TO MINXRAY
SIZE B
SCALE 1:8
SHEET 4 OF 7
APPROVAL / DATE JW 2/11/09
REV A


TOOLS REQUIRED:
#2 PHILLIPS SCREWDRIVER
ASSEMBLY INSTRUCTIONS:
1) REMOVE VERTX BASE PLATE, (4) 10-32 X 3/8 TRUSS HEAD SCREWS
2) MOUNT LOWER SHOCK MOUNT PLATE, (4) 10-32 X 3/8 FLAT HEAD SCREWS
HARDWARE:
(4) 10-32 X 3/8" FLAT HEAD SCREWS
BASE PLATE
LOWER SHOCK MOUNT PLATE
iCRco
2380 W 237TH STREET
TORRANCE, CA 90505
PART NUMBER: -
DESCRIPTION: INSTRUCTIONS FOR MOUNTING VERTX TO MINIXRAY
SIZE B
SCALE 1:5
SHEET 5 OF 7
APPROVAL / DATE JW 2/11/09
REV A


REQUIRED TOOLS:
3/16" HEX KEY
1/2" WRENCH
ASSEMBLY INSTRUCTIONS:
1) LOWER THE VERTX ONTO THE WHEEL BASE.
2) SLIP THE SHOULDER BOLTS THROUGH THE SHOCK ABSORBER AND WHEEL BASE.
3) TIGHTEN THE SHOULDER BOLT AND NUT TO THE WHEEL BASE.
HARDWARE:
(2) 5/16"-18 NYLON INSERT LOCK NUTS
(2) 3/8" ID FLAT WASHERS
(2) 5/16"-18 THREAD X 1" SHOULDER BOLTS
iCRco
2580 W 237TH STREET
TORRANCE, CA 90505
PART NUMBER: -
DESCRIPTION: INSTRUCTIONS FOR MOUNTING VERTX TO MINXRAY
SIZE B
SCALE 1:8
SHEET 6 OF 7
APPROVAL / DATE JW 2/11/09
REV A

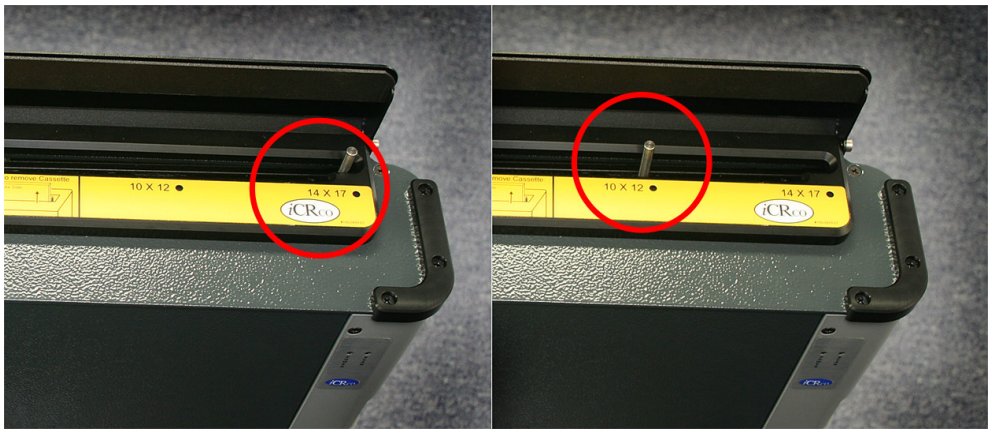

TOOLS REQUIRED:
5/32" HEX KEY
3/16" HEX KEY
1/2" WRENCH
ASSEMBLY INSTRUCTIONS:
1) LOOSELY MOUNT HANDLE ASSEMBLY TO HINGE USING (4) 10-32 X 1/2" SOCKET HEAD CAP SCREWS WITH FLAT WASHERS AND LOCK WASHERS.
2) INSERT THE SHOULDER BOLT THROUGH THE HANDLE AND SHOCK MOUNT LOCATED ON THE LAPTOP MOUNT. FASTEN WITH (1) 5/16-18 LOCK NUT ON THE INSIDE OF THE LAPTOP MOUNT.
3) TIGHTEN THE CLAMP SCREW ON THE HINGE TO SECURE THE HINGE TO THE CART FRAME.
4) FULLY TIGHTEN THE MOUNTING SCREWS ON THE HANDLE TO THE HINGE.
5) REPEAT FOR OPPOSITE HANDLE.
HARDWARE:
(8) 10-32 X 1/2" SOCKET HEAD CAP SCREWS
(8) #10 LOCK WASHERS
(8) #10 FLAT WASHERS
(2) 3/8" ID FLAT WASHERS
(2) 5/16-18 THREAD X 2.25" SHOULDER BOLTS
(2) 5/16-18 NYLON INSERT LOCK NUTS
HANDLE ASSEMBLY
iCRco
2380 W 237TH STREET
TORRANCE, CA 90505
PART NUMBER: -
DESCRIPTION: INSTRUCTIONS FOR MOUNTING VERTX TO MINXRAY
SIZE B
SCALE 1:8
SHEET 7 OF 7
APPROVAL / DATE JW 2/11/09
REV A

8. Unpacking / Setup Instructions

⚠ WARNING: This equipment employs a laser. Avoid the laser beam. Direct eye exposure to laser light must be avoided. Avoid looking down the cassette entry slot.

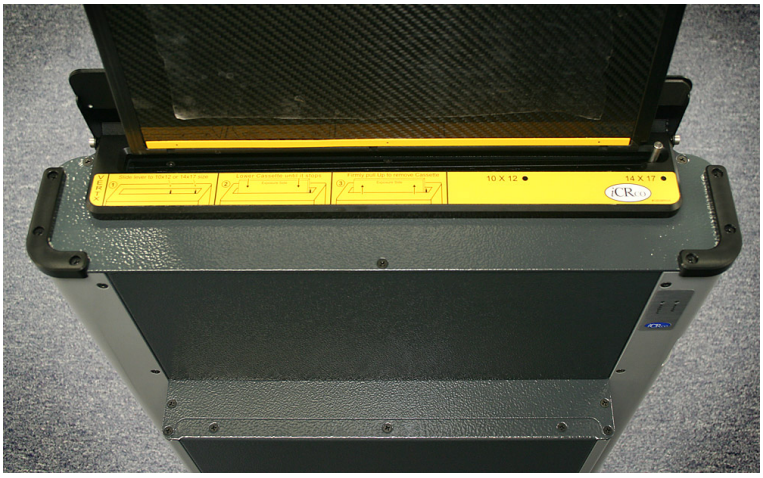
Note: The steps in this section represent a typical CR workflow. Every workflow varies in process.

1. Open the dust cover that covers the entry slot.
2. Choose the cassette size (10x12″ or 14x17″) by moving the metal rod on the right side of the scan slot to the appropriate position.



Position the metal rod towards the inside of the VERTX for a 10x12″ cassette.
Position towards the outside of the VERTX for a 14x17″ cassette.

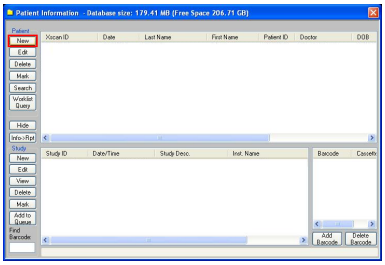
3. Load the cassette into the VERTX. The black, carbon fiber side of the cassette faces towards the front of the VERTX unit.



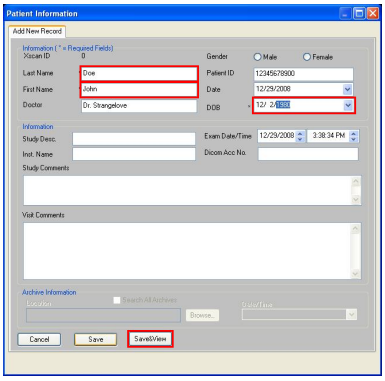
⚠ CAUTION: Do not use excessive force when loading the cassette! The cassette will not fit if the orientation is incorrect.

4. Open QPC XSCAN32.

5. Create or edit patient profile. To do this, click **New** or **Edit**, respectively.

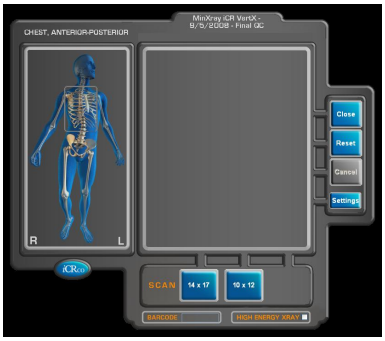


6. If creating a new patient, enter the relevant patient info, or if editing a patient, change the information accordingly (required fields are: Last name, First name, & DOB), then click **Save and View.**

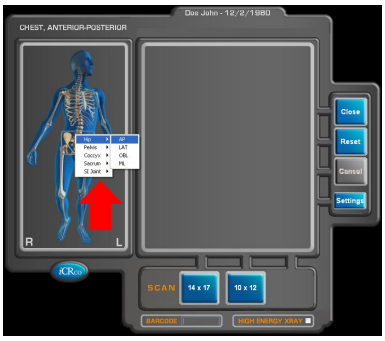


7. Click on **Scan** to bring up the Quality Processing Center Scan dialog. (if it is a patient with no images the scan dialog will automatically appear).

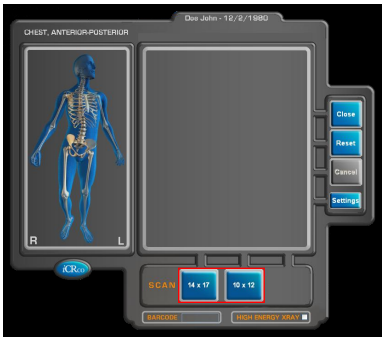
8. The ***i***CR Quality Processing Center dialog will appear.



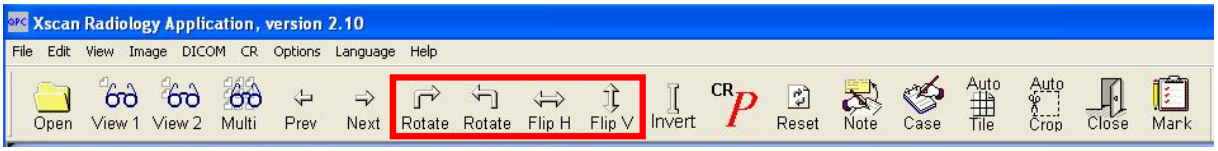
9. Select the anatomy by mousing over the skeleton on the left hand side of the Quality Processing Center dialog.



10. To begin scanning, select the cassette size by clicking the correct button (i.e. 14x17 in, 10x12 in).



11. The preview window will display the image as it is scanning. Once it has finished scanning it will automatically import the image into QPC XSCAN32.
    Note: The preview window does not accurately display the scanned image. It is intended to be a progress indicator.
12. Open the scanned image by double clicking on the thumbnail.
13. Rotate/Flip to correct orientation using the Rotate and Flip buttons in the main tool bar.



14. Remove any collimation by using the Auto Crop(located in the main toolbar), Mask, or User Mask (located in the Image Processing dialog) functions.

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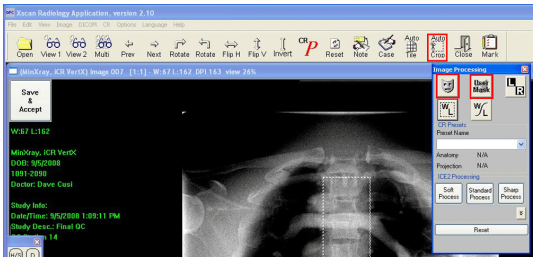
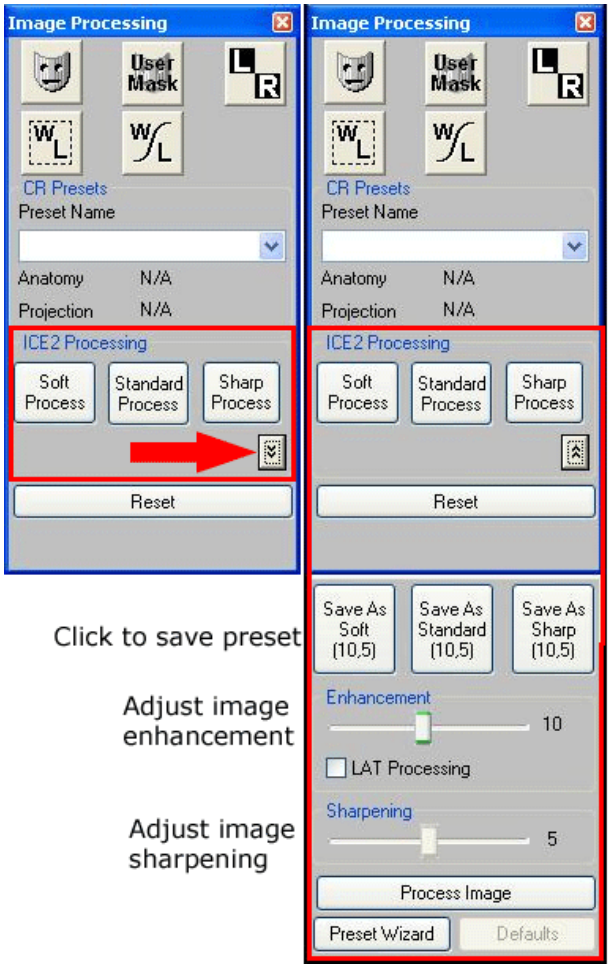
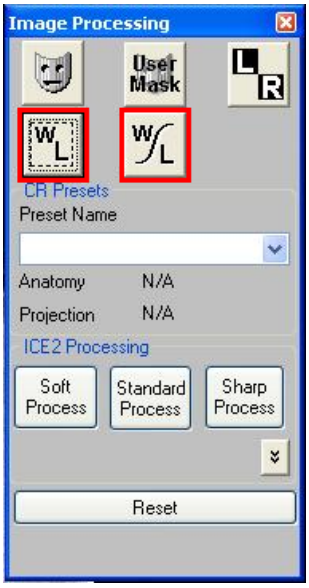


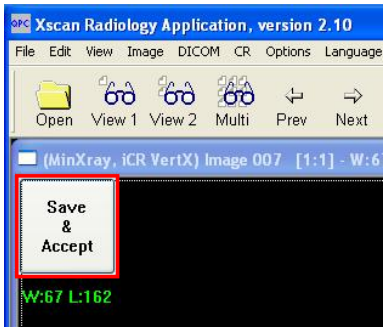
15. Enhance image by using one of the tools in the Image Processing dialog.



16. Window/Level(W/L) the image using the Window/Level or Smart Box tools.
    Note: Simultaneously hold down Ctrl + Right mouse button, then adjust the W/L on the touch pad.



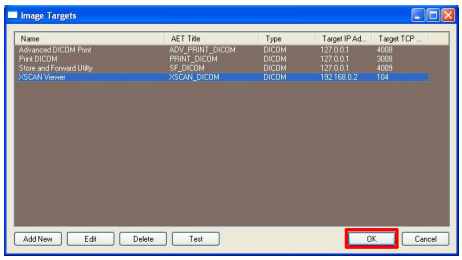
17. Accept and Save the image to save the processing and W/L settings by clicking the **Save and Accept** button in the upper left hand corner of the image.


Xscan Radiology Application, version 2.10
File Edit View Image DICOM CR Options Language
Open View 1 View 2 Multi Prev Next
(MinXray, iCR VertX) Image 007 [1:1] - W:6
Save & Accept
W:67 L:162

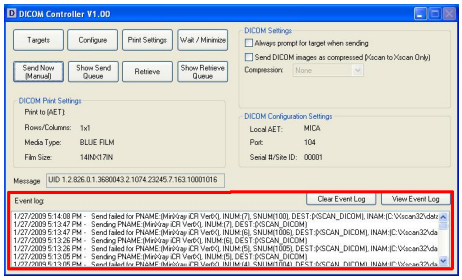
18. Return to the *Patient Information* window. Select the patient(s) to send to the Viewing station. If you wish to send more than one patient, press the Ctrl key and left mouse click to select multiple patients.

19. After selecting the patient(s), click the **DICOM Send** button.

20. The *DICOM Targets* window will appear, select the desired target, then click **OK**



21. The results of the DICOM Send will appear in the DICOM Controller window's Event log.



9. Quick Start Guides for Service

Introduction:

The VERTX unit is a combination of 5 sub-systems that work together to generate digital images. In this series of Quick Start Guides, we will demonstrate how to diagnose and fix any issues that might arise in the lifetime of a VERTX unit. The VERTX represents a step function improvement over any other CR unit in the field today, as it is extremely portable, and designed to be completely modular, allowing for fast, in-field service.

Software:

The VERTX unit comes with a powerful interface software that has many of the tools necessary to diagnose the VERTX unit in the field, and quickly determine what has to be done to repair the unit. This is the first line of defense in any service operation. It includes the scanner interface itself, along with a settings window located behind the settings button. From the settings window, a digital oscilloscope can be accessed (Focus Tool) that can guide the technician as to a cause and solution for almost any issue.

Chassis:

The VERTX unit has an exoskeleton of 5052-H32 aluminum. The exoskeleton is comprised of two side arms, and a frame, assembled from two structural aluminum extrusions and three end caps made from machined .125 aluminum plate. The definition of an exoskeleton is important because the structural integrity of the device depends on the strength of the entire unit, case, covers and internal parts, as opposed to traditional device design, which often focuses on internal structural components, surrounded by a series of plastic covers, hung from internal mounting points.

Electronics Module/wiring:

This is a series of electrical boards and wiring harnesses, located on an aluminum plate mounted to the bottom end cap of the VERTX. This set of boards and wiring harnesses are responsible for providing the proper power to the main board, the sensors, the motor, and the power and ready indicator lights.

Scan Head:

This sub-module includes the main amplification circuitry, the laser scanner, the laser, the sensor assembly, as well as the USB interface and memory of the device. This unit can be repaired in situ, or replaced as a sub-system.

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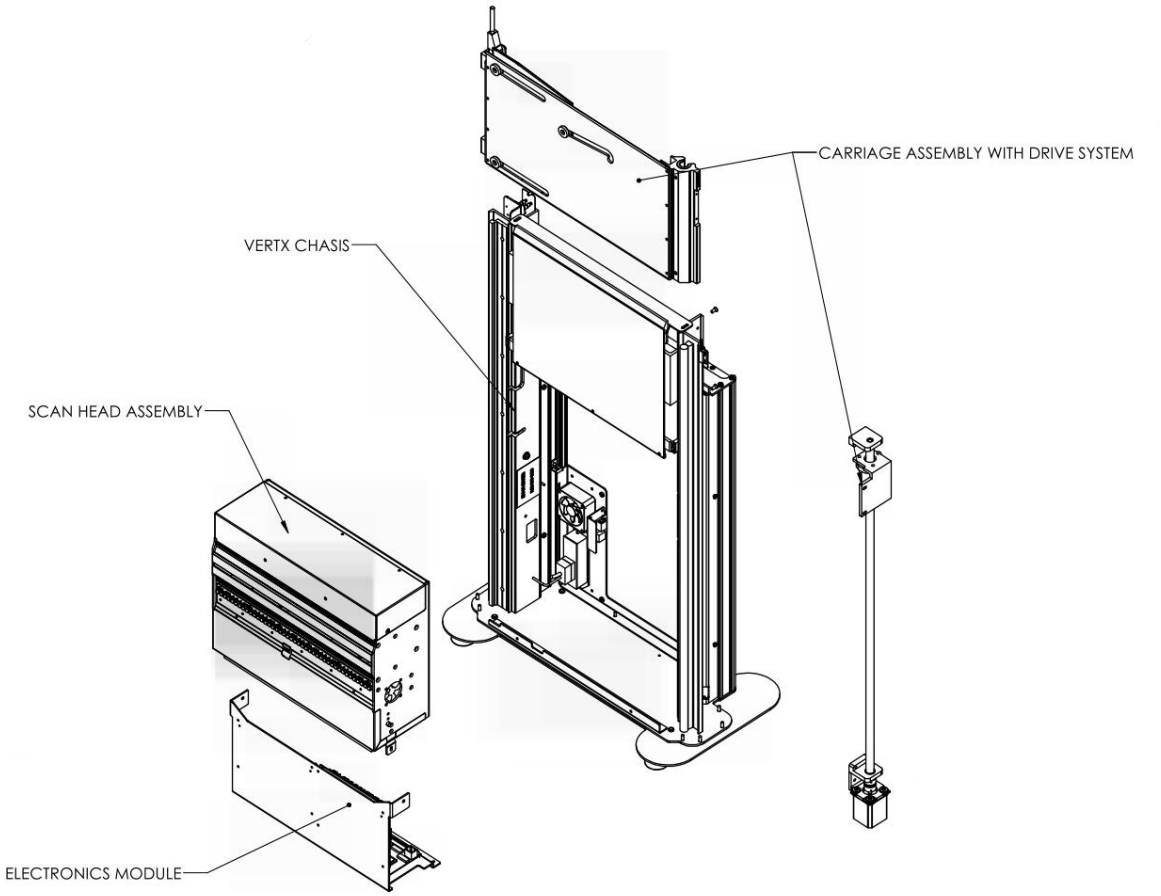
Drive System:

This includes a carriage assembly that locates and guides cassettes in and out of the VERTX unit. It is driven by a lead screw and motor assembly. The carriage assembly guide system is mounted to the Chassis, and two self-lubricating precision shafts ensure that the carriage moves smoothly and quietly into and back out of the chassis of the unit.



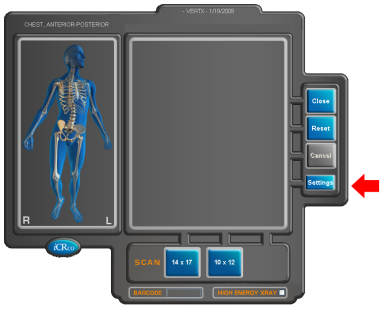
9.1 Quick Start: Software Diagnosis

Note: To use this quick start, you must have a VERTX connected to an acquisition computer using a USB 2.0 cable. Both the PC and the VERTX unit must be powered on, with the software scan interface up and running on the computer. The VERTX must be able to scan an image, and the software must be able to display the image that is scanned.

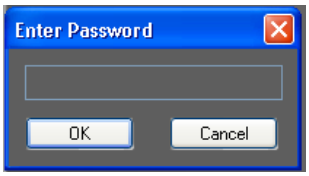
Introduction:

As in any service situation, it is important to analyze the issue before disassembling the machine. The scanner interface can provide a high level of feedback regarding any issues that the machine might have. The Focus Tool provides a digital oscilloscope output of the scanner. Signal is generated by the scanner and interpreted on the Focus Tool window as a red line. The line will be located just above zero on the 65,000 scale along the left edge of the software. The Focus Tool moves the scanner forward and stops, capturing data without moving the carriage from the stationary ”scan” position. This scan position is selectable, or you can ask the unit to return live data feed as the unit scans an entire cassette. For our purposes, it is enough to simply let the scanner come to rest at the ”scan” position and capture digitized data while we analyze the output characteristics of the unit.

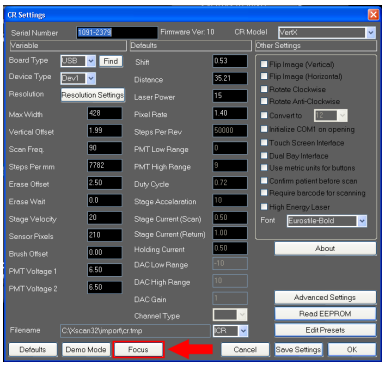
1. Leave the Cassette out of the unit and close the dust cover.
2. Open QPC XSCAN32, access the Scan interface, then click the **Settings** button on the Scan interface.



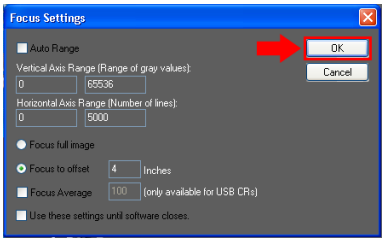
3. Enter the password *earl* in the dialog box.



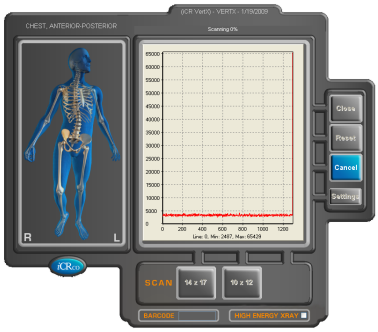
4. Click on the Focus Tool Button along the bottom edge of the settings window.



5. A new window will come up, indicating the settings for the FOCUS tool. Use the standard settings in the focus tool. Click **OK** in the dialog box. This moves the carriage 4 inches into the unit, and begins to capture data.



6. If the unit is working correctly, you will see a red data line, moving as the data is passed to the PC, one line at a time. In the default configuration, the scale is 65,000 levels of gray along the vertical axis of the window, and pixel location along the horizontal axis of the window. The Data line will be between zero and 2,500. If the line is not between zero and 2,500, you may need to re-adjust the zero point of the scanner.



7. Open the dust cover of the VERTX unit, the Data line should rise and lower slightly according to the position of the dust cover. If the room is illuminated by high frequency fluorescent lights, the line may become sinusoidal (Wavy) and move away from the zero point.

What can we conclude by looking at the digital output of the Focus Tool?

1. The unit must be capturing data because there is data being captured by the PC
2. The Laser is working because the laser moving past a start scan sensor tells the unit to start capturing data
3. The Start Scan sensor is working
4. The Galvanometer is working, swinging the laser back and forth
5. The Motor is working, moving the carriage 4 inches into the VERTX unit
6. The unit is sensing light variations as the line is rising due to more light leaking into the scan head.
7. The electronics are functional, and the cables are connected properly.
8. The unit's amplifier is working, as is the ADC and the USB 2.0 interface on the unit.

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If the focus tool does not come up, what questions can we ask?

1. Is there power to the unit (Green Power light on and steady?, Orange scan light off, or on and blinking?)

2. Does the unit move before an error condition is seen? If so, motor is working and carriage is functioning. If not, several things can be wrong: No connection to PC, No power to Unit, bad USB cable.

3. Is there a NO DATA ACQUIRED error after the motor comes to rest at the scan position?

   This indicates that the unit is not transmitting data to the PC.

   Causes include:
   Bad cable, incorrect or missing driver, bad software interface, incorrect CR model selected in scanner interface, bad settings on the VERTX unit, unsuitable USB 2.0 connection to PC.

   In addition, it can mean that the laser is not functioning, or laser power is set too low in scanner interface settings.

   It can indicate a faulty start scan switch inside the scan head, or a blockage of the laser as is swings past the start scan switch. The cable to the start scan switch could be damaged or unplugged. The cabling between the scan head and the electrical module could be unplugged.

9.2 Quick Start: Cleaning the Mirrors

⚠ WARNING:Do not use an abrasive cleaner to clean mirrored surfaces. Mirrored surfaces are delicate and can be scratched. Scratches on the mirrored surfaces can result in lines parallel to the 17 inch direction (Vertical lines) on the image.

1. Remove the front cover:

   (a) Remove 5 8-32 x $\frac{1}{2}$" flathead screws from the laptop mount.

   (b) Remove 2 8-32 x 1 $\frac{1}{4}$" flathead screws to remove the front power cowling.

   (c) Remove 2 8-32 x $\frac{1}{2}$" from the top the lip and 1 8-32 x $\frac{3}{8}$" from the bottom of the front cover.

   (d) Slide the cover up and out of the slots.

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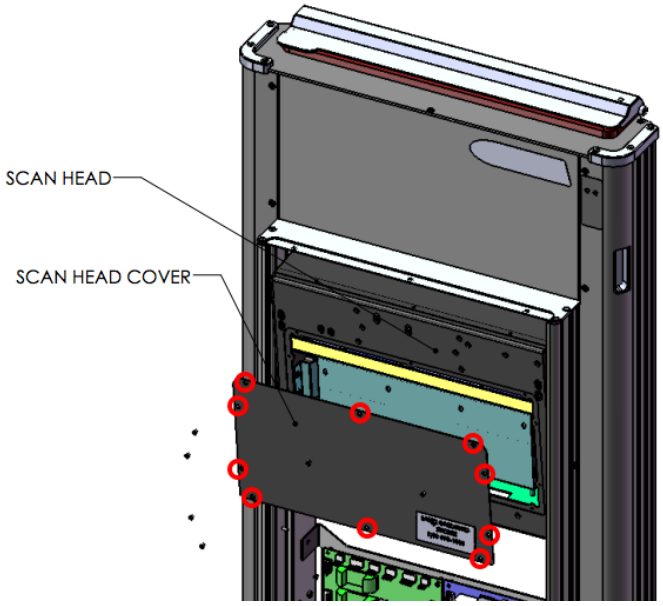
2. Remove 10 4-40 x $\frac{3}{16}$" flat head undercut screws from the scan head cover.



3. Apply glass cleaner on the soft/lint free tissue directly. Do not put cleaner directly on the mirrors. Clean the mirrors in a circular motion and do not apply a lot of force. Use a flashlight to make sure that there are no dust particles or smearing residue on mirrors.

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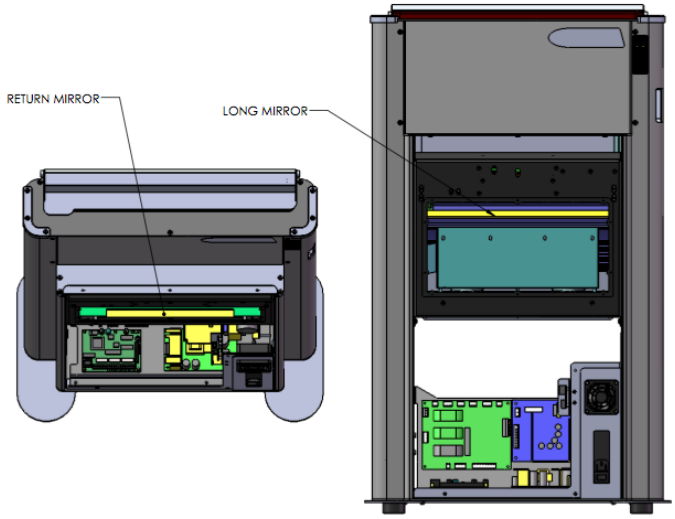
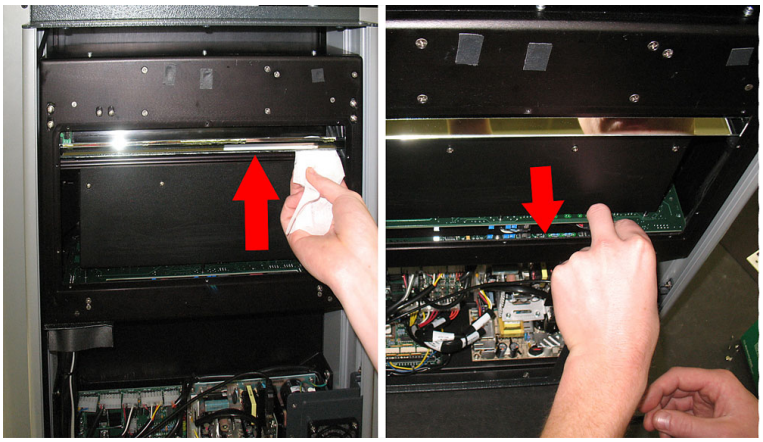
4. The location of the mirrors is shown in the graphic:





9.3 Quick Start: Repairing or Replacing the Scan Head

Introduction:

This Quickstart will provide you with an overview of the functionality of the scan head itself, along with procedures for cleaning it, and analyzing any faults that may occur in the field. It is hoped that the in-field repair of the Scan Head will never be necessary, and it is ***i***CRco policy to provide a service Scan Head kit, rather than send component parts to the field. A clear understanding of the functionality and error conditions that may occur can often provide insight that will lead to another source of the issue, and avoid costly replacement of the scan head itself.

Scan Head Construction and Function:

The Scan head module incorporates a laser light source which generates a focused red laser beam on the mirror of a galvanometer. The galvanometer rotates this mirror and the laser spot is moved across a series of folding mirrors, a total of 4 mirrors in all. After the final mirror pass the laser spot is focused through a specially coated cylinder and is finally in focus at the imaging plane. The red laser light generates a blue signal light that is captured by special sensors located inside the coated cylinder. The main board is also located inside this scan head module, and it incorporates a laser power supply module, amplification module, high voltage section, sensor mounting plugs, and ADC and USB 2.0 interface. The solid state eraser board is located on the outer top face of the scan head. A brush is located between the scan slot (Scan plane) and the eraser board.

A Start Scan Sensor is wired to the Main board. It detects the position of the laser beam and tells the main board to start capturing data.

If the laser fails, no data will be sent to the PC, initiating a NO DATA ACQUIRED message. If the Start Scan Sensor, or wiring between sensor and main board fails, the same message will be generated.

If the Galvo fails, the laser will not swing past the Start Scan Sensor, and again, No Data Acquired will be displayed.

The scan head has one cover that can be removed without removing the scan head from the VERTX itself. The bottom mirror cover allows access to the two long mirrors for cleaning. White, out of focus, vertical lines parallel to the 17 inch axis on a 14X17 imaging cassette indicate that there is dust or particulates on one of the two long mirrors. See Section 9.2 for more information on cleaning the mirrors.

SCAN HEAD REMOVAL:

If it is determined that the scan head is faulty, and replacement is needed, thoroughly read & understand these instructions, then attempt to remove the scan head.

⚠ DANGER: Do not connect unit to power with covers removed.

⚠ DANGER: Do not attempt to test functionality with covers removed. This can permanently damage the VERTX unit and can cause harm to the operator.

1. Remove the Front Cover:
   (a) Remove 5 8-32 x $\frac{1}{2}$" flathead screws from the laptop mount.
   (b) Remove 2 8-32 x 1 $\frac{1}{4}$" flathead screws to remove the front power cowling.
   (c) Remove 2 8-32 x $\frac{1}{2}$" from the top the lip and 1 8-32 x $\frac{3}{8}$" from the bottom of the front cover.

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(d) Slide the cover up and out of the slots.

2. Remove the wire connectors as shown. Be careful not to damage the phone jack connection wire, and the other wiring harnesses or plugs when removing them from the power distribution board. **Note Connectors:**

   (a) Phone Jack wire to Motor Controller Board

   (b) USB 2.0 Connector to interface board beside fan

   Connections to Power Distribution board:

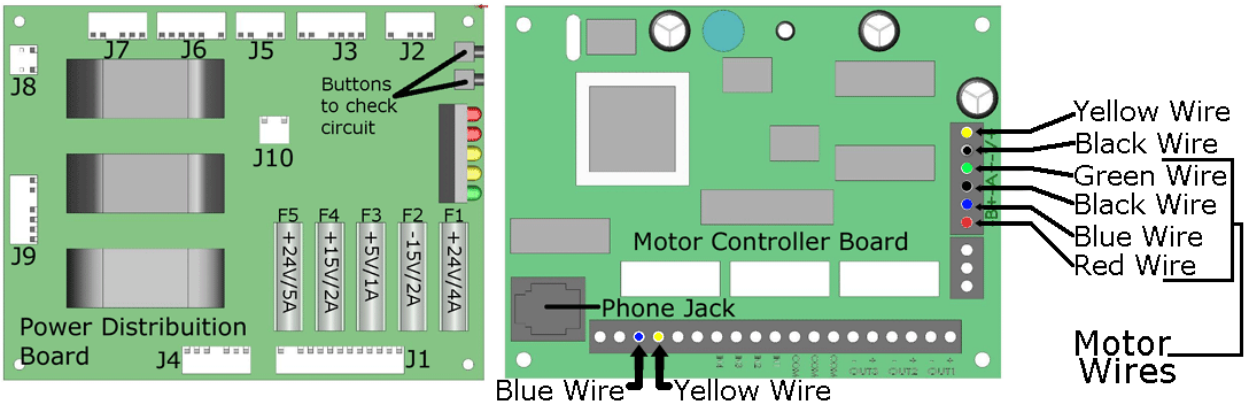
   (a) PMT Board Power cable (J3)

   (b) Galvo Power Cable (J5)

   (c) Fan 1 Power connector (J8)

   (d) Eraser Power Connector(J9)

   Note: There is a small dab of glue that holds the wiring harness to the board. This is used to ensure that the wire connectors do not come off during shipping. If it is not expected to ship the unit to another location, glue is not necessary when replacing the wiring harness.

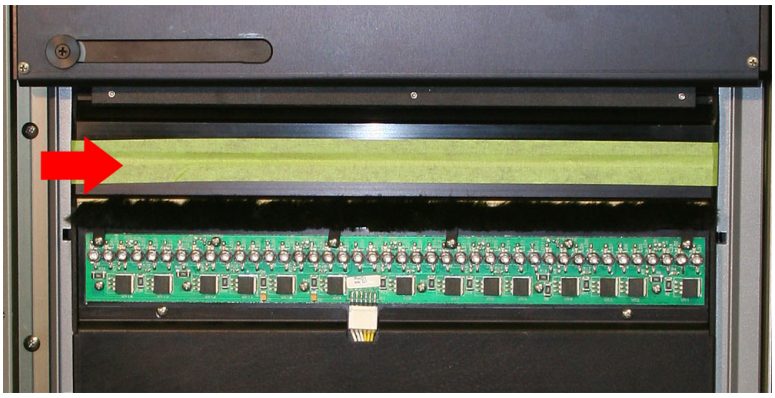


3. Remove the Back Cover:

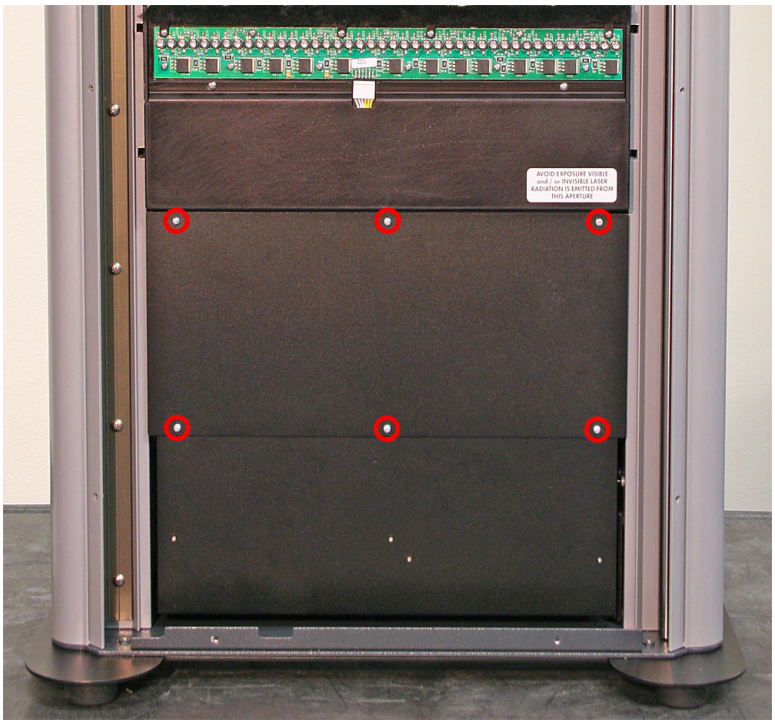
   (a) Remove 10 8-32 x $\frac{1}{4}$" truss screws and tooth lock washers from the back panel. There are three on each side, two on the top, two on bottom.

   (b) After removing the back cover, cover the cylinder slot with masking tape to prevent dust from entering the system.

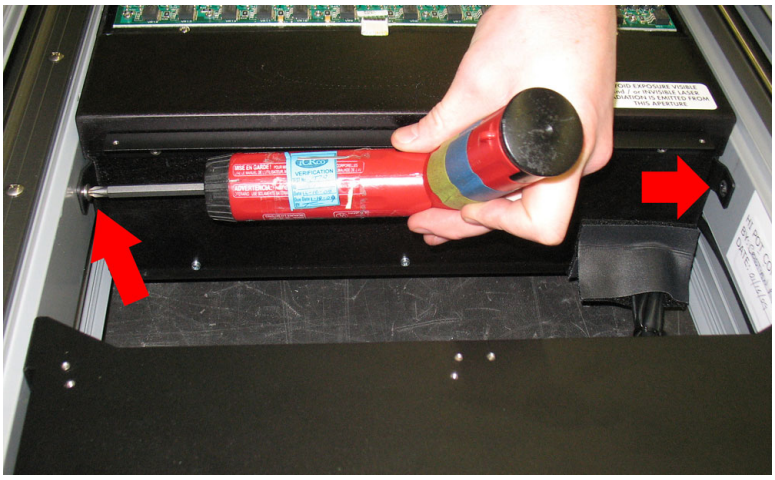
4. Cover the cylinder slot with masking tape to prevent dust entry.



5. Remove 6 4-40 x $\frac{1}{4}$″ pan head screws with washer and lock washer from the Eraser Plate.

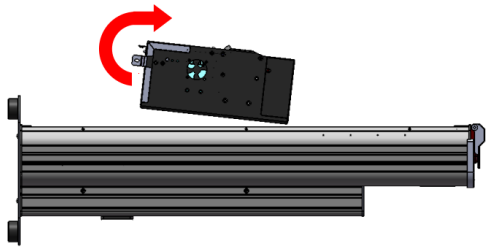


6. Remove screws holding up scan head: 2 8-32 x $\frac{1}{2}$" truss head screw with lock washer.

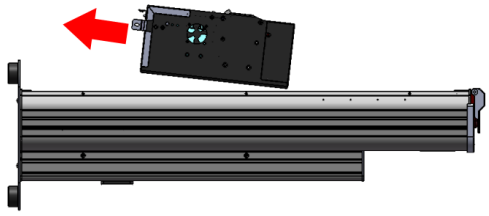


7. On a clean, flat surface, gently orient the VERTX unit so that the unit is laying with the front of the VERTX facing down.

8. With the carriage assembly at the home position, lift the bottom of the scan head module toward you, it will rotate and as you press down gently, it will move down the release slot.



9. Pull the scan head module out of the device, being sure that all cables are disconnected.



Replacement

Remove anti-static bag and tape from the new scan head. Replace the scan head as shown and replace the electrical connectors. Tighten the two screws holding up the scan head to torque #1. Close the covers without fastening screws and test unit by connecting power to it and turning it on.

⚠ DANGER: Do not connect unit to power with covers removed.

⚠ DANGER: Do not attempt to test functionality with covers removed. This can permanently damage the VERTX unit.

⚠ WARNING: Do not look into scan slot with the VERTX unit turned on.

9.4 Quick Start: Electrical Bracket Testing & Replacement

Introduction

Please refer to the electrical block diagram to describe the function of each board and the wiring between the boards. The ***i***CRco VERTX unit is comprised of an electrical module, coupled to the scan head through several wiring harnesses. Should it be determined that a component on the electrical bracket has failed, it is possible to either replace the component itself, or simply replace the entire Electrical bracket with the boards and wiring on it.

⚠ DANGER: Do not connect unit to power with covers removed.

⚠ CAUTION: Make sure the technician is properly grounded when handling electrical components.

⚠ CAUTION: Make sure the VERTX unit is powered off and the power cord is removed from the unit before handling electrical components.

⚠ WARNING: The VERTX unit uses a laser. Do not look into scan slot with the VERTX unit turned on. Avoid looking at the laser, as it can cause eye damage.

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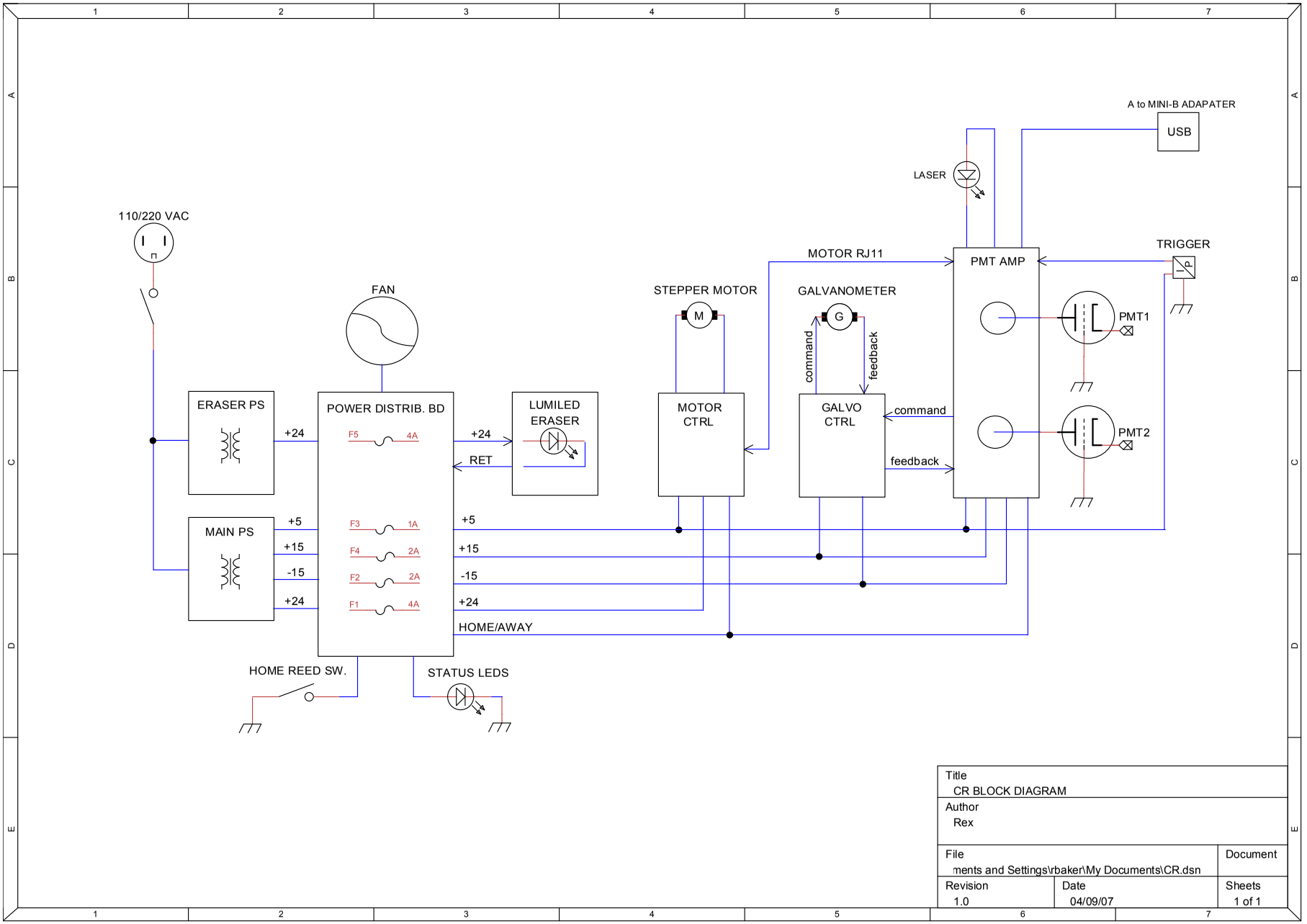
A to MINI-B ADAPATER
USB
LASER
110/220 VAC
MOTOR RJ11
PMT AMP
TRIGGER
FAN
STEPPER MOTOR
GALVANOMETER
M
G
command
feedback
PMT1
PMT2
ERASER PS
POWER DISTRIB. BD
LUMILED ERASER
MOTOR CTRL
GALVO CTRL
command
feedback
+24
RET
MAIN PS
+5
+15
-15
+24
F5 4A
F3 1A
F4 2A
F2 2A
F1 4A
HOME/AWAY
HOME REED SW.
STATUS LEDS
Title
CR BLOCK DIAGRAM
Author
Rex
File
ments and Settings\rbaker\My Documents\CR.dsn
Document
Revision
1.0
Date
04/09/07
Sheets
1 of 1

1. To replace the electrical bracket, be sure the VERTX unit is turned off, and that the power plug is removed from the front of the VERTX. ⚠ WARNING: Operating the VERTX with the covers off is dangerous to the user and the machine, and can cause harm.

2. Orient the VERTX on a table top, or on the ground. Be sure that the unit is stable, so that it will not fall over during this service.

3. Remove the Front Cover:

   (a) Remove 5 8-32 x $\frac{1}{2}$" flathead screws from the laptop mount.

   (b) Remove 2 8-32 x 1 $\frac{1}{4}$" flathead screws to remove the front power cowling.

   (c) Remove 2 8-32 x $\frac{1}{2}$" from the top the lip and 1 8-32 x $\frac{3}{8}$" from the bottom of the front cover.

   (d) Slide the cover up and out of the slots.

4. Remove the Back Cover:

   (a) Remove 10 8-32 x $\frac{1}{4}$" truss screws and tooth lock washers from the back panel. There are three on each side, two on the top, two on bottom.

   (b) After removing the back cover, cover the cylinder slot with masking tape to prevent dust from entering the system.

5. Remove the wiring harness connectors that attach the Electrical bracket to the scan head: PMT Board Power cable (J3), Galvo Power Cable (J5), Fan 1 Power connector (J8), Eraser Power Connector(J9). See Figure 9.1 on page 60 for a diagram.

6. Remove the power inputs (J1 & J2) from the power distribution board, and the fan power connectors(J8 & J10). See Figure 9.1 on page 60 for a diagram.

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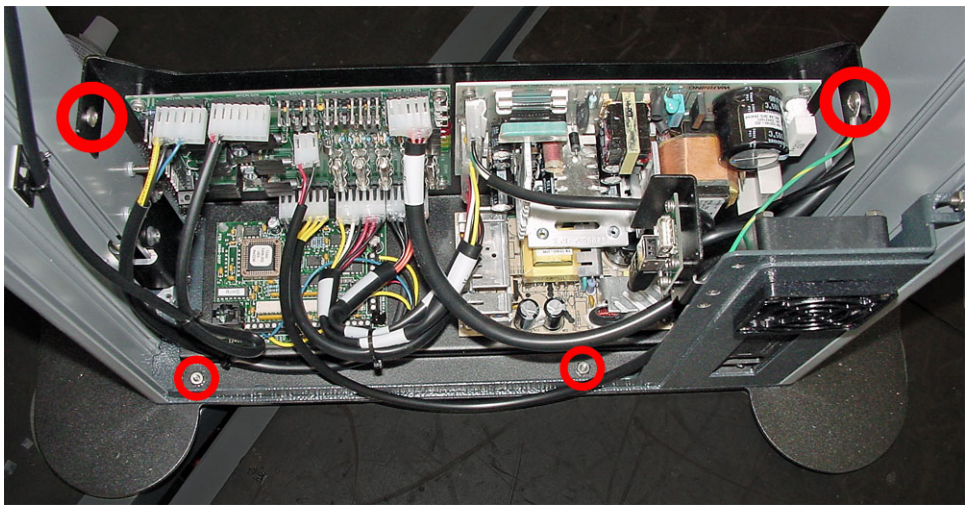
7. Remove the side bracket mounting screws using a #2 screwdriver, then remove 2 6-32 nuts along the base of the unit .



8. Carefully lift out the electrical bracket, being sure that there are no connecting wires that could catch the bracket and become damaged.

9. Remove anti-static bag from new Electrical bracket, and install in reverse order to removal.

   ⚠ CAUTION: Be sure that screws are replaced and tightened to specifications, so that screws do not come loose and damage electrical boards at a later date. Be sure that all screws and nuts are replaced properly and tightened to secure electrical bracket.
   ⚠ WARNING: Do not turn unit on without covers in place.

10. Reconnect all cabling from the scan head: PMT Board Power cable (J3), Galvo Power Cable (J5), Fan 1 Power connector (J8), Eraser Power Connector(J9), Power Inputs (J1 & J2), and Fan Power Connectors (J8 & J10) check the figure below to be sure that cables are connected correctly before closing unit. See Figure 9.1 on page 60 for a diagram.

9.5 Quick Start: Turning Unit on with Covers Removed

⚠ WARNING: Removing covers of VERTX unit while unit is on, or turning unit on while covers are removed can result in permanent damage to the unit. The following safeguards must be in place before turning a unit on.

1. If possible, Connect VERTX unit, select the scanner interface.

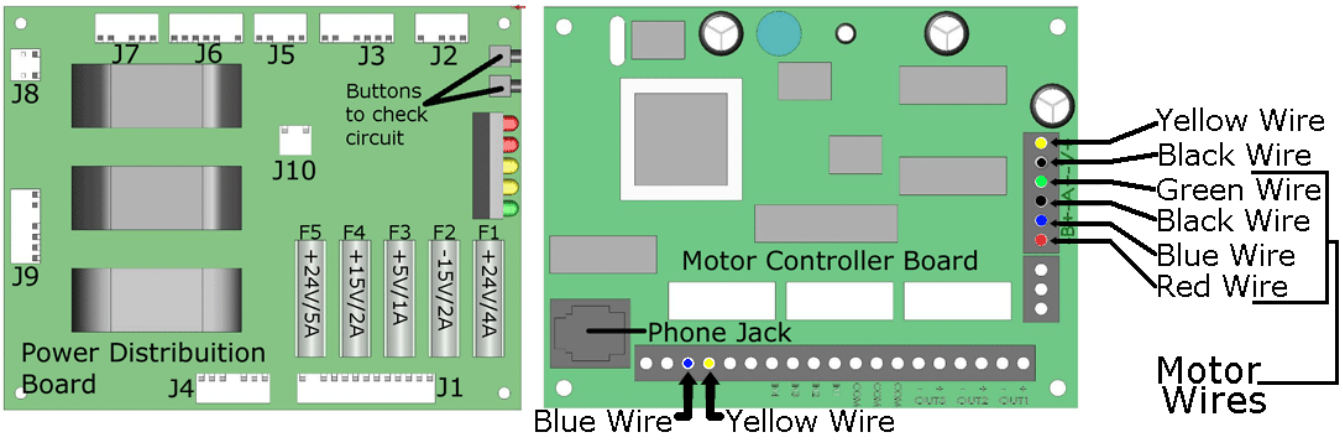
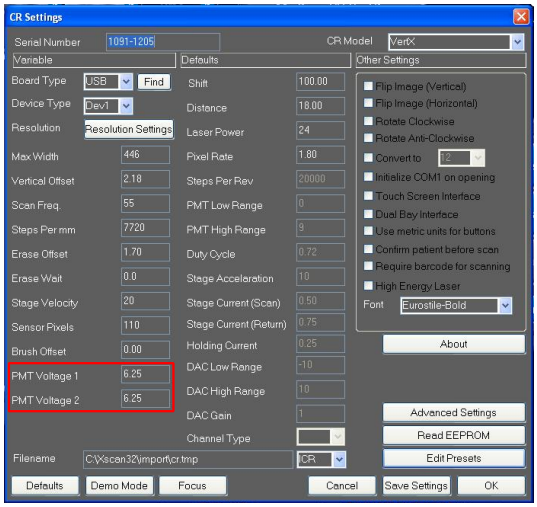


Figure 9.1: Power Distribution Board & Motor Controller Board

2. Click on the Settings Button (enter the password *earl*), and Turn the PMT Voltages 1 & 2 to 0. Select Save Settings.
   ⚠ WARNING: Failure to set the PMT Voltages to zero (0) may cause damage to the PMTs. Failure to set the PMTs to zero (0) will void the warranty.



3. Click **Scan** on the scanner interface. A message should appear : Reprogramming EEPROM. Then unit should begin to scan. Click **Cancel**.

4. You can test to see if this has actually disabled the high voltage by scanning an exposed plate. There should be a salt and pepper noise pattern from the unit, with no dark patterns, or image generated by a scan.

5. Power off the unit, then remove power cable from the power entry module.

6. Remove the Front Cover:
   (a) Remove 5 8-32 x $\frac{1}{2}$" flathead screws from the laptop mount.
   (b) Remove 2 8-32 x 1 $\frac{1}{4}$" flathead screws to remove the front power cowling.
   (c) Remove 2 8-32 x $\frac{1}{2}$" from the top the lip and 1 8-32 x $\frac{3}{8}$" from the bottom of the front cover.
   (d) Slide the cover up and out of the slots.
7. Remove the Optical Cover to gain access to the High Voltage Switch. The High Voltage Switch is located on the PMT board.
8. Locate High Voltage Switch and ensure that it is located in the off position. The switch is a slider that is slid to the middle of the unit to turn it off, slid out to turn high voltage off.
9. Unplug the Eraser cable (J9) from the Power Distribution Board.
   ⚠ WARNING: Exposure to eraser lights can be harmful to the user and to the unit. Ensure that the Eraser power cable is disconnected before attempting to power on the unit with the covers removed.
10. Once high voltage is off, the unit can be turned on with the front cover removed.
11. If removal of the back cover is necessary, power off the unit, then remove the power cord from the power entry module.
12. Remove the Back Cover:
    (a) Remove 10 8-32 x $\frac{1}{4}$" truss screws and tooth lock washers from the back panel. There are three on each side, two on the top, two on bottom.
    (b) After removing the back cover, cover the cylinder slot with masking tape to prevent dust from entering the system.

Check that the power switch on the VERTX unit is on, and that the green Ready light on the front of the machine is on and steady. If the Orange scan light is off, the unit is at the home position. If the orange light is blinking, click on the *Reset* button in the scanner software interface. (In XSCAN, click on the patient data folder, enter in patient details (service, test, today's date etc.), click on **Save and View** to bring up the scanner interface.

Take an X-ray on one of the 14X17 inch VERTX cassettes, and insert it into the unit:

1. Click on Scan and listen as the unit begins a scan. It should be almost completely quiet. Only the motor revolutions can be heard, and the fan on the front of the unit makes some noise. The green power light is on and steady, the orange scan light is blinking. A blank image should appear (since high voltage is off), line by line in the preview window.

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If an Image does not appear, check the following:

(a) A message pops up indicating that the unit has a NO DATA ACQUIRED condition. This means that the unit is not passing data to the PC through the USB 2.0 connection. This can be due to bad cable between computer and VERTX, Bad or cable unplugged inside the VERTX unit, malfunctioning scan head.

(b) If the carriage assembly/cassette begins to scan, then stops and returns a NO DATA ACQUIRED message, then it is most likely a bad board inside the Scan head assembly. Please refer to Scan head Maintenance and replacement Quickstart guide for repair or replacement of this sub-system.

An image appears, However:

(a) It is blank: Check output of X-ray machine

(b) No or very low signal image: Check X-ray machine, Check settings in scanner interface, Click on Settings, Type in password (earl), check PMT Voltage settings. The PMT sensors should be set to 6.25-7.0 Volts.

(c) Lines on image: Lines parallel to the small axis of the cassette (i.e. in a 14X17 inch cassette, lines across the 14 inch direction): Check to see if X-ray grid has been used.

(d) If a grid has been used, either rotate grid 90 degrees to the X-ray cassette, or apply the Grid Removal tool in the software pull down menu. Please refer to the Software Quickstart Guide: Use of Grids with *i*CRco CR units.

(e) Lines on image, no grid used: If lines parallel to the 14 inch axis appear over images, even when a grid has not been used, refer to the Quickstart guide: Lines and artifacts on images.

(f) Vertical lines on image: Lines parallel to the 17 inch axis of the image. The main cause of line artifacts on the long axis are dust and dirt in the optical path.

Dirt or heavy dust particles can obscure the light emitting from the scanning laser spot. At every location that the spot is blocked, a white line will appear on the image. If the white line is in focus (Very fine line) then the blocking object is located very close to the imaging plane. If on the other hand the white line is very broad, out of focus, then it is likely that the blocking object is located on a mirrored surface within the scan head.

(g) Part of the image is offset: Bad Galvo inside scan head, bad cable to Galvo or galvo motor controller board inside scan head.

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10. Theory of Operation

10.1 Product Overview

The VERTX is a upright/portable computed radiography machine that scans one cassette at a time. It is designed to accomplish this in less than 1 minute.

The VERTX produces a diagnostic quality, 16 bit image from a medical grade storage-phosphor image plate. The optical assembly provides a flying spot laser with a focal spot size of 80 microns. The laser scans across the plate and data is captured at a given rate. Each sample is reassembled to create an image. The capture sampling rate can be modified to create images with resolutions from 100 microns (250 DPI) to 200 microns (120 DPI). The unit can scan images up to 35 cm x 48 cm. The laser spot focused to 80 microns is moved back and forth across an imaging plate as the plate is moved through the digitizer. The resultant Digital X-ray can be viewed, manipulated and stored and even printed to a film or paper image. The images are stored and manipulated using the standard medical image format (DCM) and the medical imaging transfer protocol, DICOM 3.0.

10.2 System Configuration

Optical Beam Path

The VERTX unit contains a 664 nm 15 mW laser, Lens optic and four mirrors, a scanning galvanometer, and a light collection system.

The round laser spot is focused through a focusing lens to produce a round output beam. The beam is deflected by a galvanometer scanner to produce the scan across the plate. The folding mirrors bend the beam and the focused laser spot travels vertically down the plate as it moves horizontally across the scan head.

In order to reach the plate, the beam passes through an integrating collection cylinder. As it hits the surface of the plate, the red light from the focused laser stimulates blue emission from the image plate in direct proportion to the X-ray energy stored in the image plate as a result of the exposure. This blue light is collected by the integrating cylinder. The red light is blocked from reaching the sensors by blue glass filters.

The collected blue light is detected by photomultiplier sensors, which convert the photons into a signal.

This signal is then logarithmically amplified, corrected for spatial variations in the

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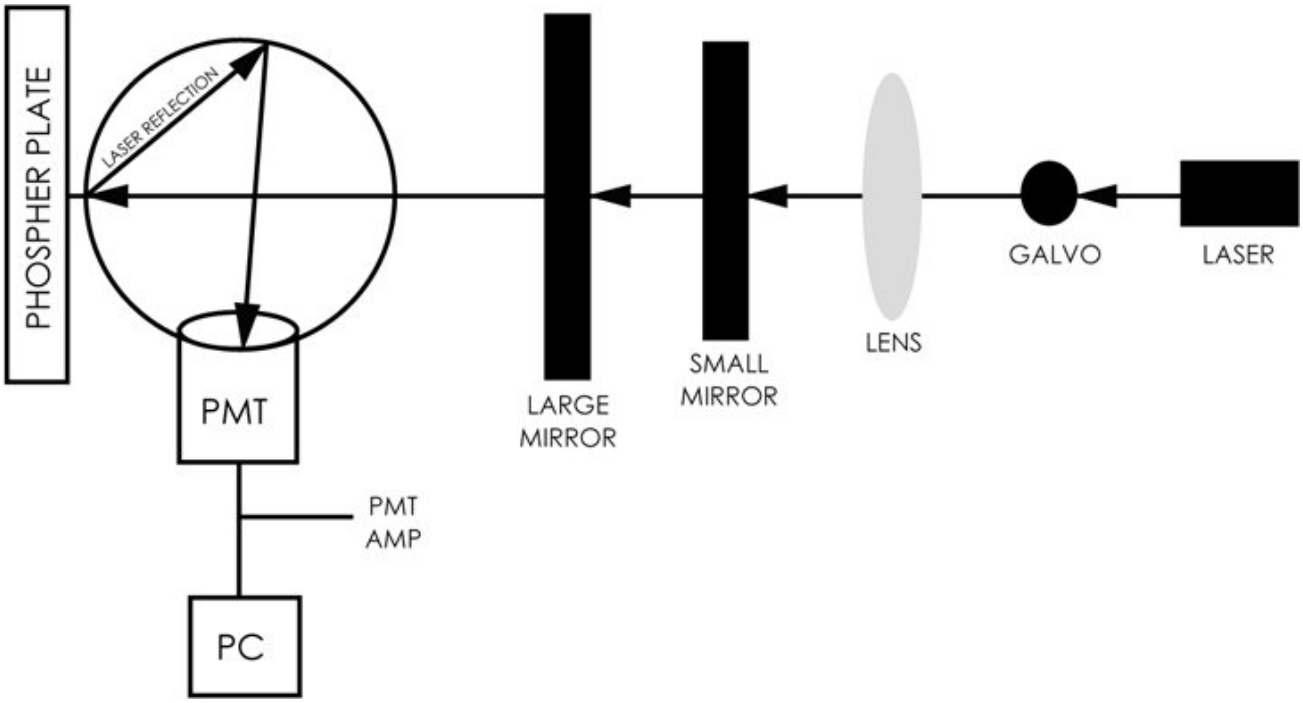
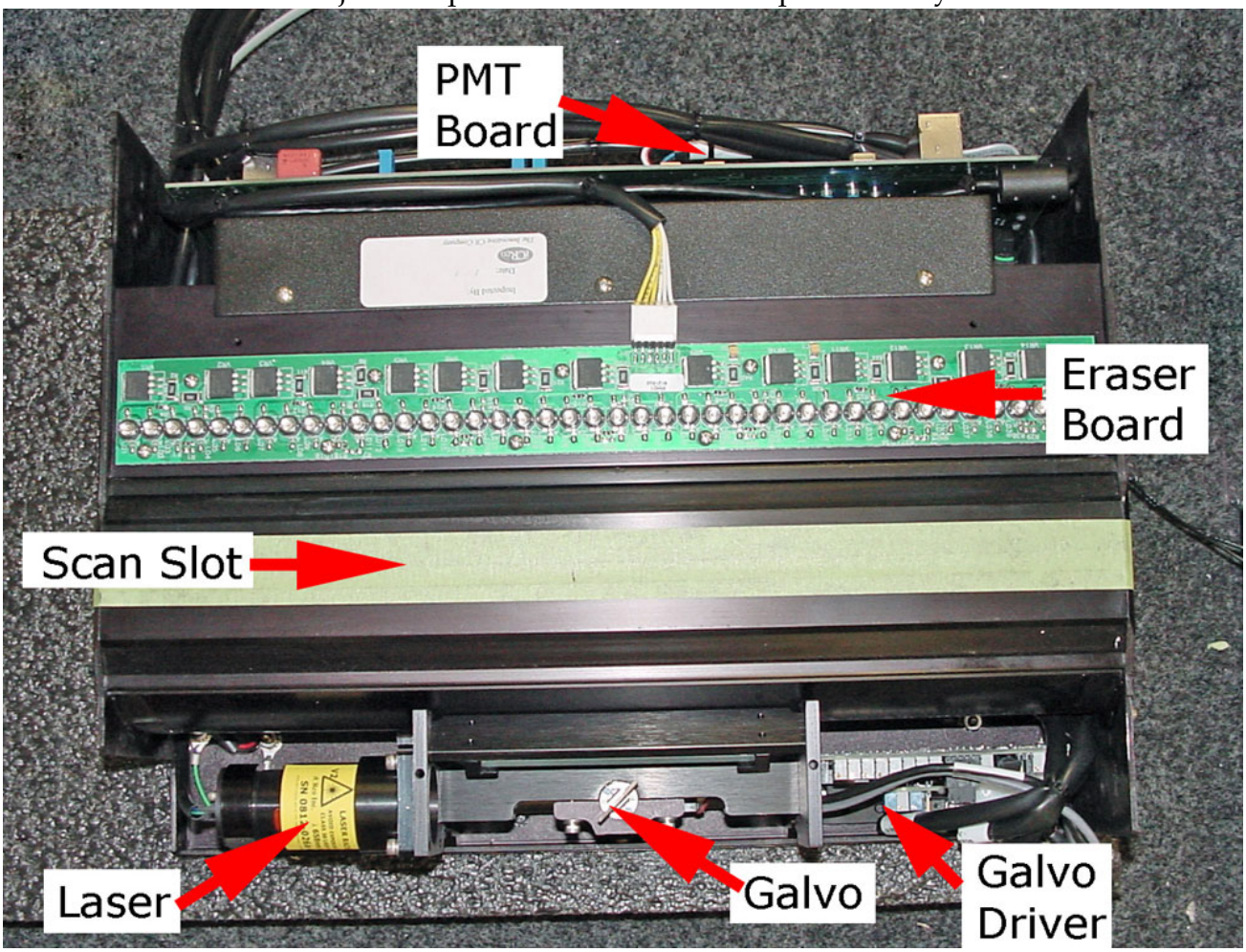
system sensitivity across the width of the screen, and then digitized by an A/D converter.

Optical Cavity Overview



Digital and Electrical Systems

Major Components of the VERTX Optical Cavity



Galvonometer Board

The Galvo Servo board contains a feedback amplifier that results in extremely accurate control of the mirror mounted on the shaft of the scanning galvanometer.

The galvo motor shaft oscillates back and forth through an arc of approximately 30 degrees at a rate of 90Hz. A small mirror attached to the shaft intercepts the static laser beam and sweeps (scans) it across the width of the image plate.

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Indicator Board

Two LED indicator lamps are used to signal scanner power ON and SCAN status. The SCAN indicator is turned on only while a scan is in process; it also blinks whenever the plate is in the optical path.

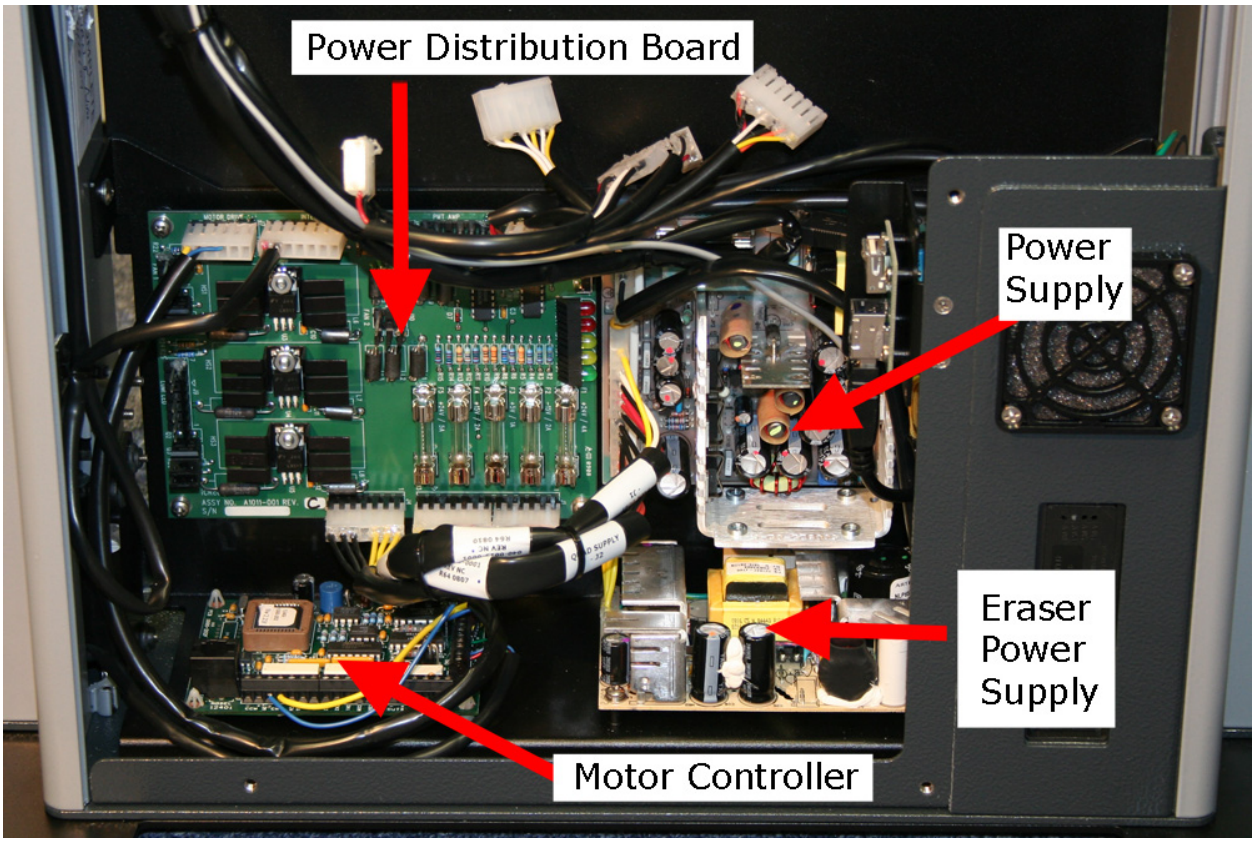
Anti-Jitter Board

A small L shaped board located at the end of the integration cylinder.

PMT Board

The photomultiplier tube amplifies the photons from the CR plate and converts them into electrical signals.

Electrical Overview



Power Distribution Board

The VERTX Unit Uses Four Power Supplies:
Large supply: $\pm 18V, \pm 12V$, +5 V.

Small supply: +24 V.
High Voltage Supply (PMTs): 1000 V.
⚠ WARNING:Do not handle supply when unit is on. Do not disconnect cables when unit is powered up.

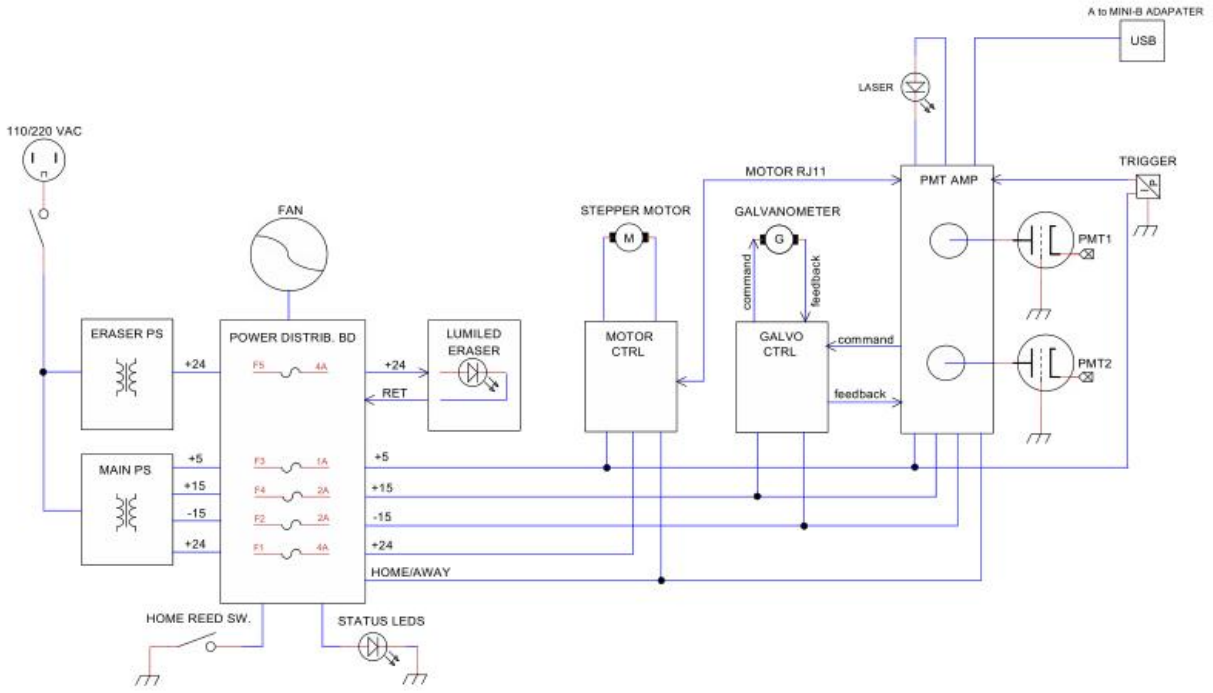
LED Eraser Board

The LED Eraser board provides single wavelength light to erase CR plate.

Motor Controller Board

This section of the VERTX unit controls the stepping motor to drive the plate past the scan head and return it to the "home" position.

Block Diagram



Analog to Digital Conversion

During the scanning process signals are generated by the PMT sensors and transmitted to the computer through a USB 2.0 interface cable. A trigger signal generated by the laser spot is transmitted to the PMT board to trigger a line capture. Image is assembled from lines of captured data that is held in registers and translated into a 16 bit raw source file. There is no way to pause the data capture process. Cancel will cause the machine to stop and return to home position. Data on the CR plate will be lost.

Note: If an image is canceled during the scan process, the plate will have to be erased again to ensure that the plate is entirely erased.

Calibration

Gain Adjustment

Gain Control is used to compensate for reduction in sensitivity of the PMT detectors due to age. The gain can be adjusted in the software.

1. Open QPC Xscan32
2. Create/open patient
3. Click on Scan (if it is a patient with no images the scan dialog will automatically appear).
4. The Quality Processing Center dialog will appear.
5. Click on the Settings button and type in the password *earl*. It is case sensitive.
6. A dialog box will appear where the user can manually change the gain.

PMT Amplifier

The amplifier is the interface between the PMT receiving the stimulated light from the collection chamber. The amplifier serves as a current to voltage converter and a log amplifier.

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11. Diagnostics

If a system failure occurs, it is necessary to diagnose the cause before beginning the repair. This section describes the diagnostic tools and techniques used to isolate various types of system failures.

11.1 Troubleshooting

The cause of some failures may be obvious. In these cases, the Service Engineer may proceed directly to the repair. Before beginning an investigation, it is a good practice to record as much information about the current state of the system as possible. This information may include, but is not limited to, symptoms, conditions under which symptoms exist, voltages, settings, cleanliness, and visual state. Normal generic troubleshooting techniques apply. With knowledge of the system, isolate the failure to a particular subsystem. With knowledge of the subsystem, trace the symptom back to its cause. In many cases, failures are caused by lack of periodic maintenance and cleaning. If a system is known to be behind schedule for its maintenance and cleaning at the time of the failure, it is a good practice to clean and re-calibrate the system before extensive troubleshooting. In many cases this solves the problem or provides clues as to the cause.

Preliminary Checks:

1. Make sure the VERTX is powered by at least a 1500W/1500VA UPS (uninteruptable power supply).
2. Make sure that the VERTX is connected to the acquisition computer using a USB 2.0 cable.
3. Check that the VERTX unit is powered by a standard NEMA 5-15 hospital grade cable.
4. Make sure that no other devices that emit strong radio frequencies are not in close proximity to the VERTX.

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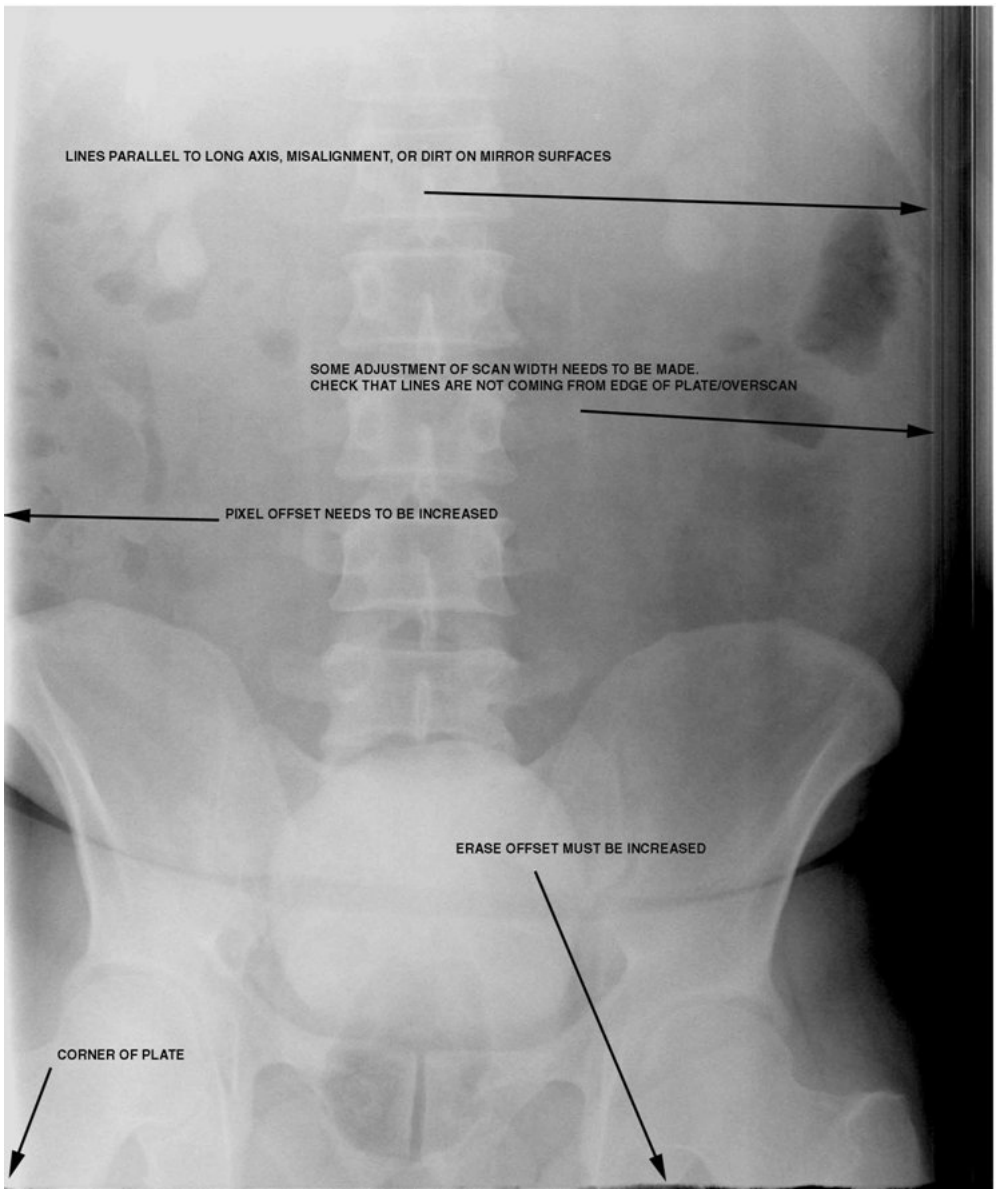
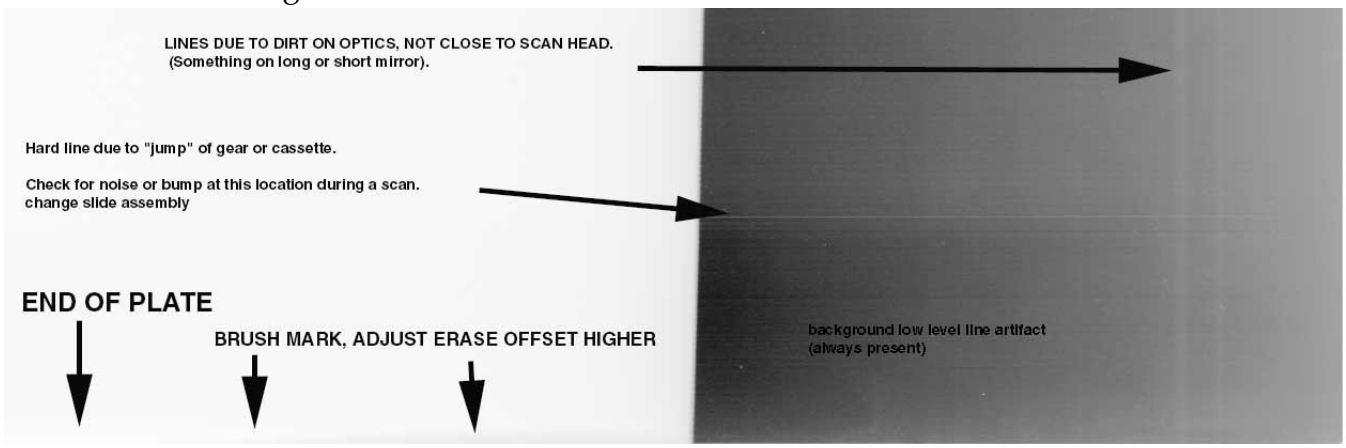
Symptoms and Their Causes


LINES PARALLEL TO LONG AXIS, MISALIGNMENT, OR DIRT ON MIRROR SURFACES
SOME ADJUSTMENT OF SCAN WIDTH NEEDS TO BE MADE.
CHECK THAT LINES ARE NOT COMING FROM EDGE OF PLATE/OVERSCAN
PIXEL OFFSET NEEDS TO BE INCREASED
ERASE OFFSET MUST BE INCREASED
CORNER OF PLATE

11.2 Vertical Lines in Images:

Vertical lines in the images are most often caused by something in the scan path, that maybe stopping the laser from reaching the plate. If the lines are random within an image, but repeatable in each successive image, there is likely lint/dust blocking the beam near the focal point of the Laser. This is the most common cause of vertical lines. The procedure for removing lint is described in Section 13.4. If cleaning does not remove the lines, moving the beam up or down a couple of millimeters sometimes helps. This is

done with the 45 degree roof mirror.


LINES DUE TO DIRT ON OPTICS, NOT CLOSE TO SCAN HEAD.
(Something on long or short mirror).
Hard line due to "jump" of gear or cassette.
Check for noise or bump at this location during a scan.
change slide assembly
END OF PLATE
BRUSH MARK, ADJUST ERASE OFFSET HIGHER
background low level line artifact
(always present)

11.3 Horizontal Lines & Banding in Images

Lines that appear on an image are caused by several different sources. It can be quite difficult to separate these causes and find the cure. Because light can interact with the scanning laser capture system, it is important to remove the possible causes of lines in a systematic manner to find the solution. If lines are present, and the user is using a grid while exposing the cassette, please see Section 11.3.1 for information related to grid lines. Lines that are parallel to the 14 inch direction are caused by light or mechanical components.

The most common cause of horizontal lines is excessive ambient light. Verify that the light present in the room is 2EV maximum. In many cases, too much ambient light will create dark horizontal bands at the top and the bottom of images.

11.3.1 Lines caused by a grid:

A grid is typically constructed from fine inter-spaced layers of lead and aluminum. X-Ray energy is passed by the aluminum and stopped by the lead. A grid with 103 lines per inch (LPI) has 103 layers of lead in one inch. This type of grid will cause a moiré effect if the grid is aligned parallel to the 14 inch direction on the plate. Lines will change as the image is zoomed up and down.

Solution

Take a test image without a grid present to check to see if the lines are still present.

Change the grid to a 178 lines per inch grid, or rotate the cassette under the grid so that the grid lines are perpendicular to the 14 inch direction.

11.3.2 Lines caused by light:

A common cause of lines across a 14 inch length is light incursion. These lines are typically seen at the ends of the cassette. (Top and bottom of the 17 inch length).
If the door is left open during a scan these lines will appear. Another cause can be a light leak in the eraser cover.

Solution:

Lines caused by light can be controlled in several ways. As an experiment, turn off all the lights in the room, or cover the machine with a black cloth. Scan a test image and check to see if the lines are still present. Reduce the light levels in the scan room.

11.3.3 Lines caused by Over Exposure:

Lines can be created when low level background noise is amplified by over exposure. Images do not become darker with higher exposure.

Solution:

Expose a test image at a standard exposure and note the presence of lines. Reduce the exposure to see if the lines are no longer present.

11.3.4 Lines caused by bad power:

The VERTX unit is susceptible to surrounding electronic noise. If the power source is not stable, this could cause line artifacts in the image. Please be sure to use a UPS (Uninterruptible Power Supply) of at least 1500VA or 1500W.

It is possible to drive noise into the system with a bad network cable. Noise caused by a bad network cable is more likely to be wavy lines.

Solution:

Ensure that the UPS is connected properly and that the unit is being powered by the ***i***CRco provided power cord. Unplug the Internet connection from the computer, then scan and check for lines.

11.3.5 System will Not Detect Phosphor Screens

If the laser fails or does not cross the jitter sensor, the plate will travel for 3-4 seconds and then return to the home position with an error message of ”No Data Acquired.”

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To determine if the laser is functioning, remove the back cover, cover the scan slot with tape, remove power from the eraser lights, then turn the laser on and visually determine if the laser is functioning. Ensure that the interior of the scanner is not exposed to ambient light, as this will damage the Photo-Multiplier Tubes (PMT).

11.3.6 No Galvanometer Movement

If there is no Galvo movement, troubleshooting should start with checking the -15/+15 V circuits on the power distribution board by pressing down the 2 test buttons on the board. If one or both yellow lights are not lighting up it means that one or both fuses have blown and that the driving power is interrupted. Proceed by checking the wires connected the Galvo and Galvo controller. Another source of this problem could be the Sequence Controller.

11.3.7 Low Signal Images

If the image appears in the scan interface, but is very faint, the PMT voltages will need to be checked. In the scan interface, click on *Settings*, enter the password *earl*, then check the PMT Voltage Settings. The PMT sensors should be set to 6.25-7.0 Volts.

11.3.8 NO DATA ACQUIRED Error Message

The NO DATA ACQUIRED error message signals a wide variety of problems.

Please try the following solutions in order:

1. Ensure that the unit is plugged into a USB 2.0 port on the computer. Plugging the unit into a slower (USB 1.0 or 1.1) port will cause a NO DATA ACQUIRED message.
2. Ensure that the drive is properly installed. With the unit powered on and connected to the computer, go into the Device Manager, and check to see that there are no yellow exclamation points in the USB section.
3. Try a different USB 2.0 cable. It is possible that the USB 2.0 cable has failed.
4. Ensure that the acquisition computer does not have any power saving functions enabled. Some power saving functionality causes the USB ports to run at less than optimal speed. Check the Power Saving features in the Windows Control Panel, as well as the computer's BIOS.
5. Make sure that all the wiring connected to the Power Distribution board and Motor Controller board has not come loose.
6. Check the fuses on the Power Distribution board. Hold down the two buttons and see if the LED lights come on.

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7. Attempt to make a scan. After clicking the *Scan*, listen for the motor and watch to see if the slide moves at all. If the motor doesn't move at all, check the motor controller board.

8. If the unit begins to scan, then stops, and returns a NO DATA ACQUIRED message, it is more than likely a bad board inside the scan head. See Section 13.5 for information about changing the scan head.

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12. Preventative Maintenance

⚠ DANGER: This equipment employs a laser. Laser radiation may be present if the VERTX unit is operated without covers. Avoid laser beam. Direct eye exposure to laser light must be avoided.

⚠ CAUTION: Make sure the technician is properly grounded when handling or working with electrical components.
⚠ CAUTION: Make sure that the VERTX unit is powered off and that the power cord is removed from the unit before handling electrical components.
⚠ CAUTION: Do not clean the galvo mirror. Dust and fiber in the laser beam path may affect the radiographic image.
⚠ WARNING: It is important that the covers remain on the system at all times. The covers should only be removed for service, and then immediately replaced.

Close Dust Flap

Closing the dust flap on the VERTX, when not in use, is the easiest way to help prevent dust from entering the system. It is good operating practice to keep the dust flap closed when the VERTX is not in use.

Cleaning the Outside of the VERTX

The outside covers of the VERTX unit should be cleaned with Simple Green® and Ball® SUN-UP® glass cleaner or Sprayway® glass cleaner. Do not spray the cleaner directly on the VERTX covers. Spray on a soft, clean cloth, and then wipe down the covers.

Cleaning the Fan Filter

The fan keeps clean air circulating inside the machine. The fan filter will need to be cleaned periodically. Visual inspection of the fan filter should be sufficient to determine if cleaning is necessary. If the fan filter is dirty and requires cleaning, refer to 13.3 for cleaning instructions.

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Cassette Storage

All cassettes should be stored in the cleanest, driest conditions possible. Always store the cassettes in a location where they are not likely to be knocked over or damaged.

Cassette Cleaning

The outside of the cassette can be cleaned with Simple Green®. Do not spray the cleaner directly on the cassette covers. Spray on a soft, lint free, clean cloth, then wipe down the covers.

⚠ CAUTION: At no time should any abrasive cleaners or chemicals be used to clean the cassette or plate, as this will void the warranty.

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13. Service & Maintenance Procedures

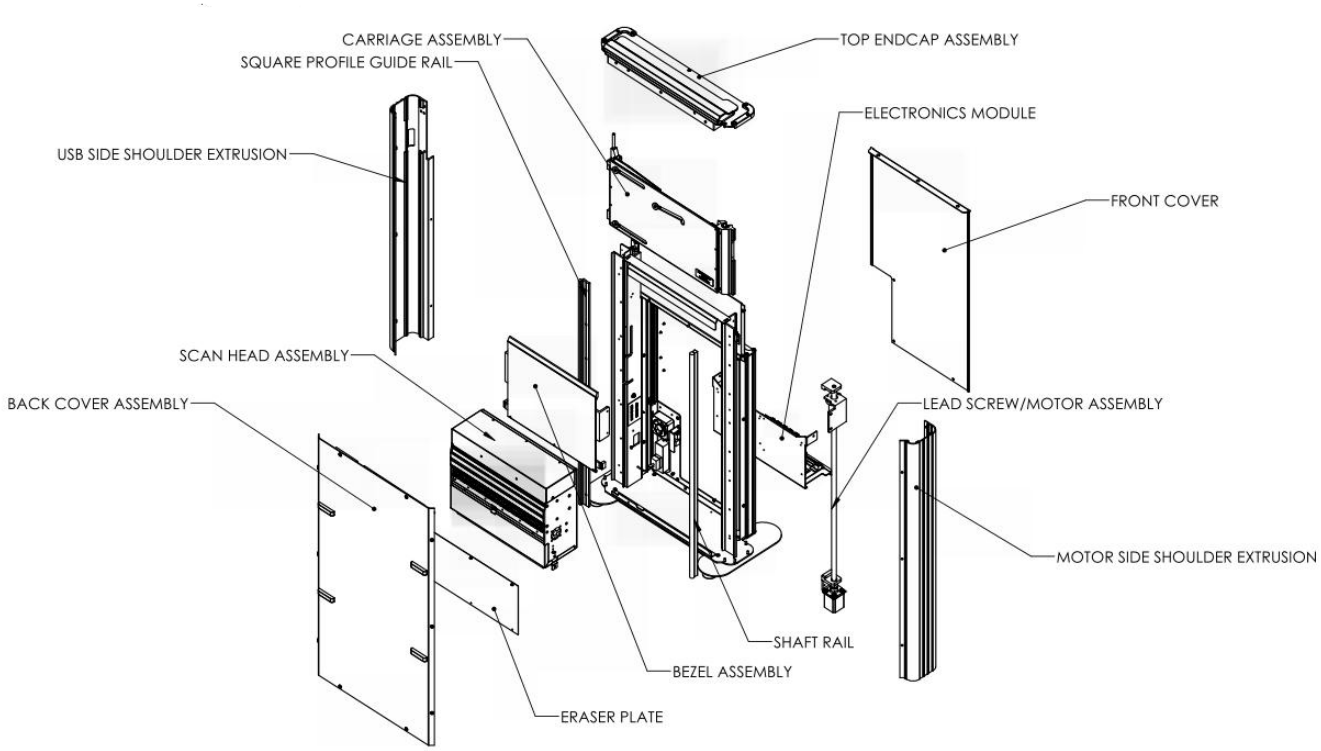
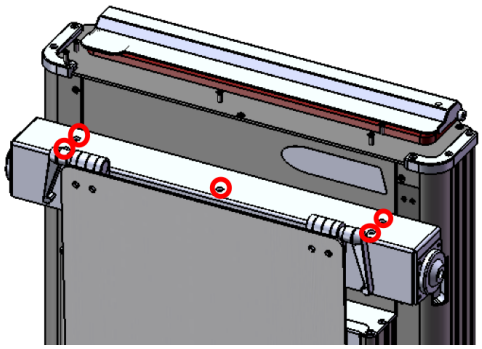


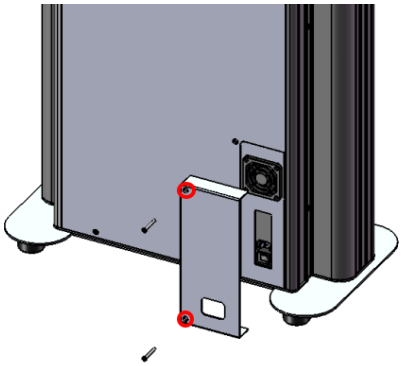
Figure 13.1: VERTX system overview.

13.1 Removing Front Cover

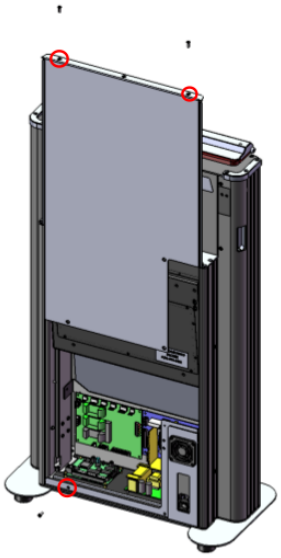
1. Remove 5 8-32 x $\frac{1}{2}$″ flathead screws from the laptop mount.



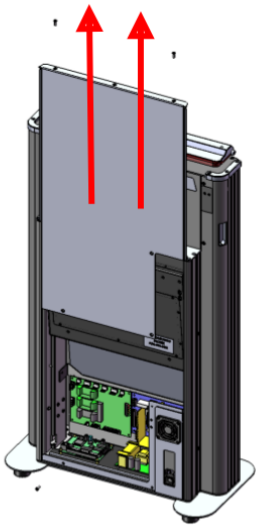
2. Remove 2 8-32 x 1 $\frac{1}{4}$" flathead screws to remove the front power cowling.



3. Remove 2 8-32 x $\frac{1}{2}$" from the top the lip and 1 8-32 x $\frac{3}{8}$" from the bottom of the front cover.

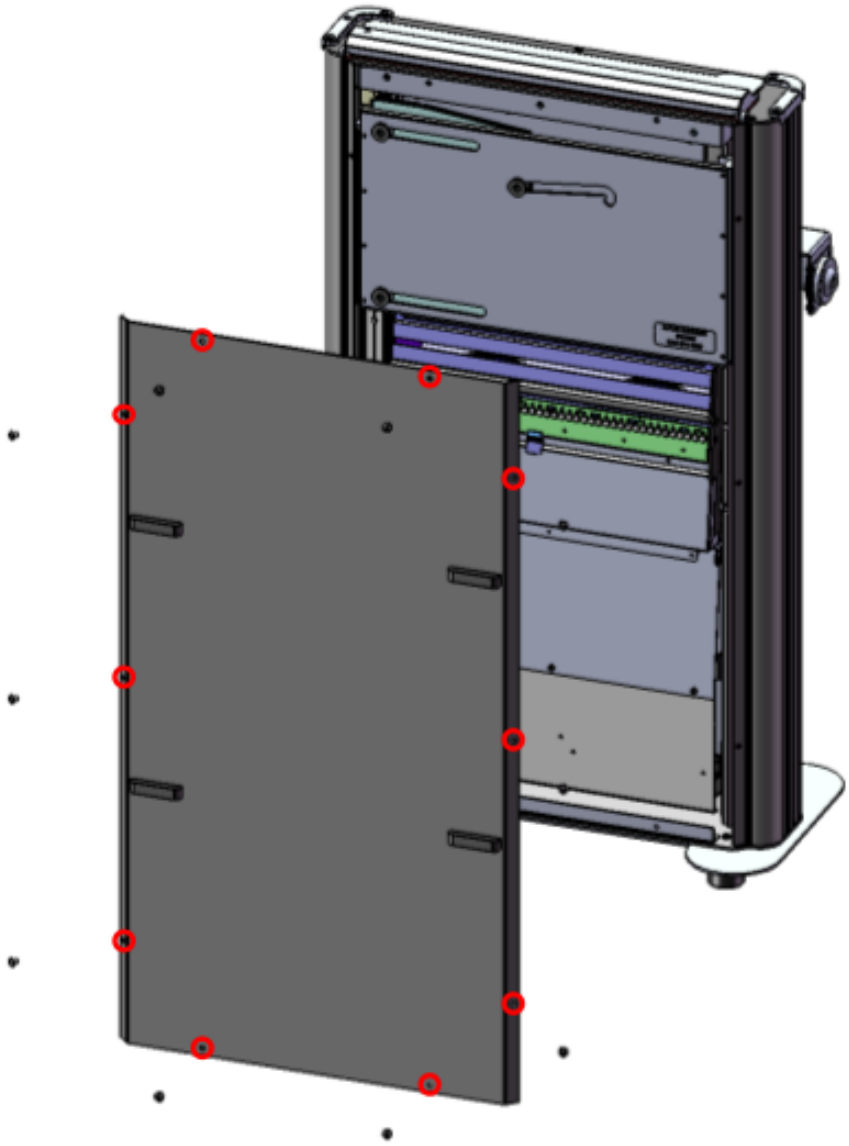


4. Slide the cover up and out of the slots.



13.2 Remove Back Cover

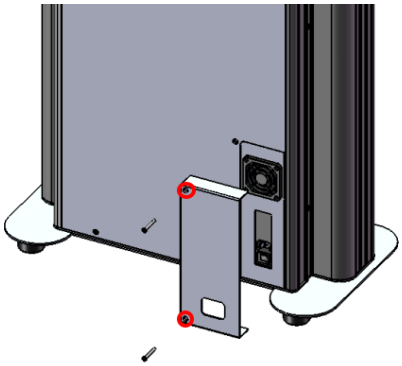
1. Remove 10 8-32 x $\frac{1}{4}$" truss screws and tooth lock washers from the back panel. There are three on each side, two on the top, two on bottom.



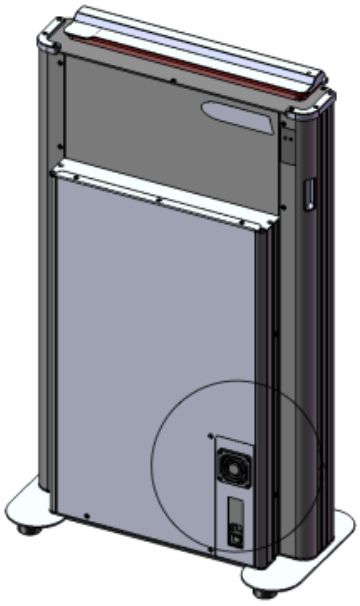
2. After removing the back cover, cover the cylinder slot with masking tape to prevent dust from entering the system.

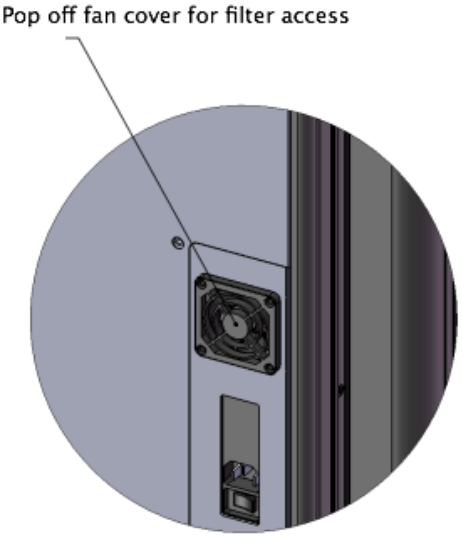
13.3 Cleaning the Filter

1. Remove 2 8-32 x $1\frac{1}{4}$" flathead screws to remove the front power cowling.



2. There is access to the front fan. The fan cover pops up with minimal force.



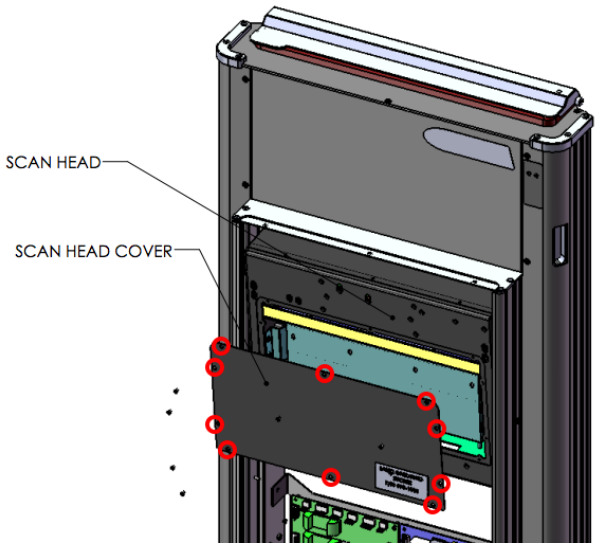


3. To clean the filter, rinse with water and dry thoroughly.

13.4 Cleaning the Mirrors

1. Remove the front cover as covered in the section on removing the front covers.

2. Remove 10 4-40 x $\frac{3}{16}$" flat head undercut screws from the scan head cover.



3. Apply the cleaner on the soft/lint free tissue directly. Do not put cleaner directly on the mirrors. Clean the mirrors in a circular motion and do not apply a lot of force. Use a flashlight to make sure that there are no dust particles or smearing residue on mirrors.

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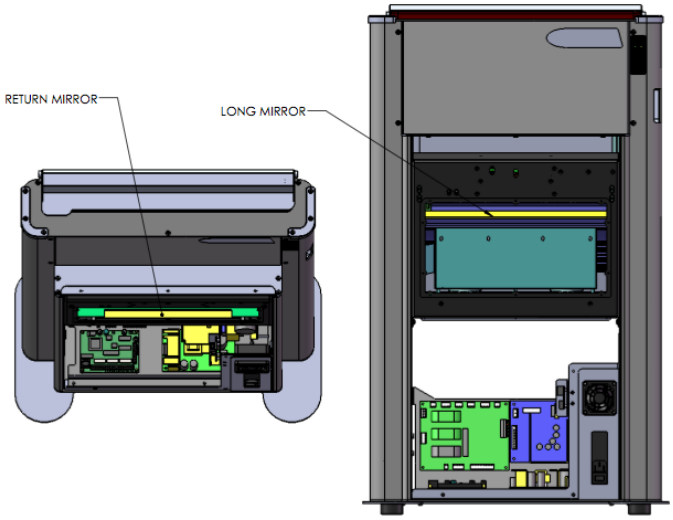
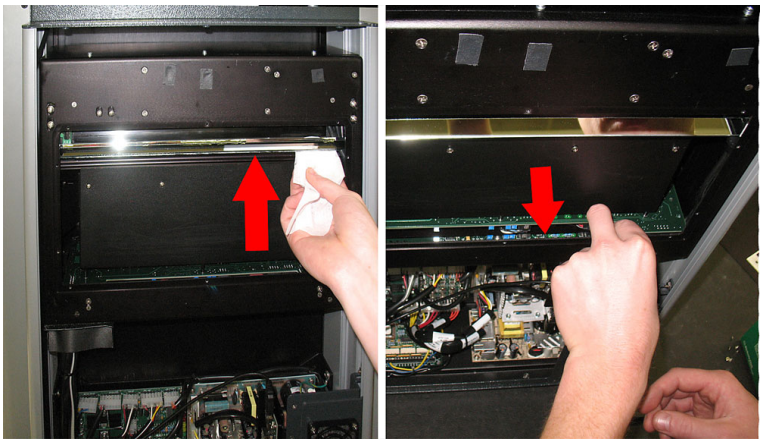
4. The location of the mirrors is shown in the graphic:

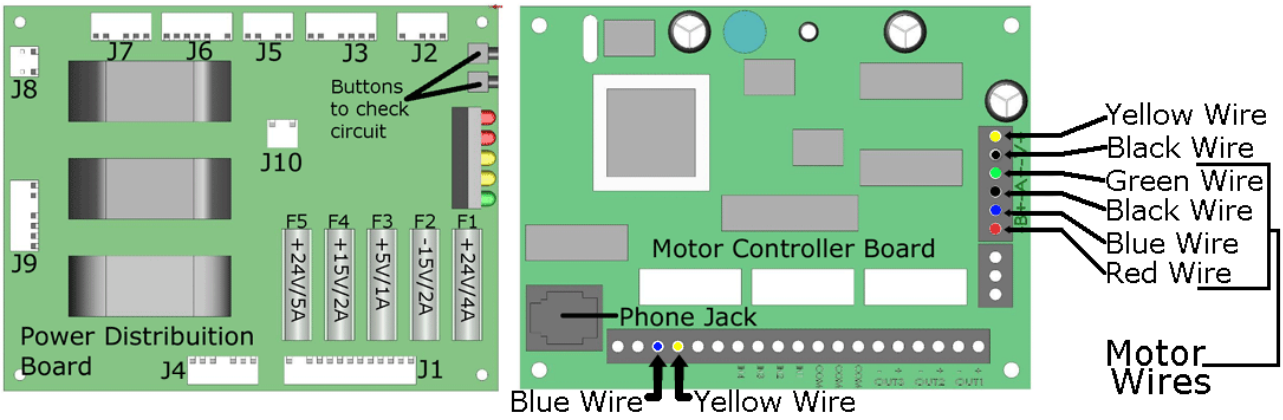




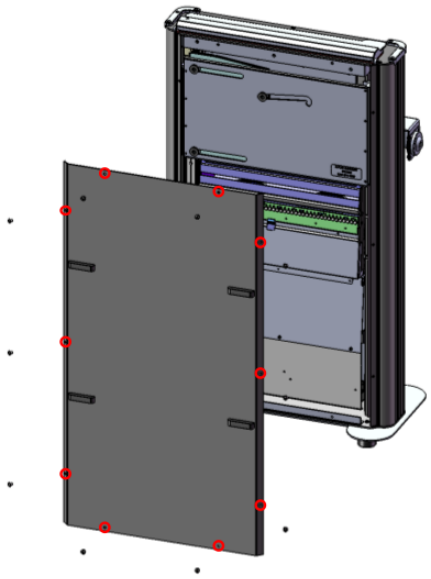
13.5 Removing the scan head

1. Remove the front cover, as covered Section 13.1.

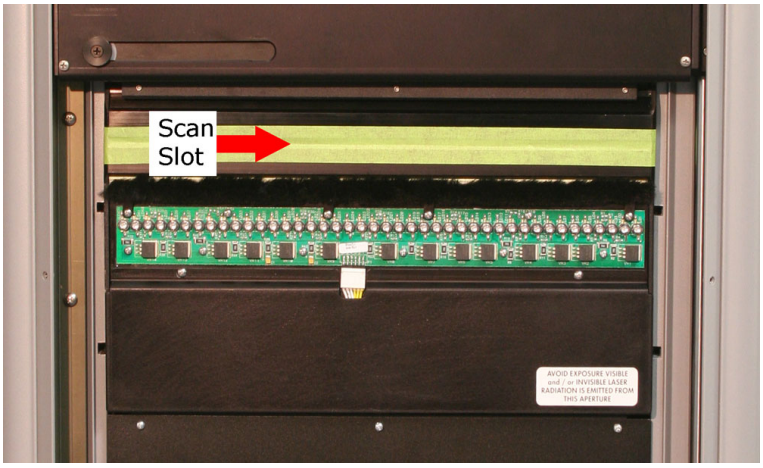
2. Unplug the cables that run out of the scan head:
   Power Distribution board: J8 J9 J5 J3 J2
   Phone cable (on the Motor Controller board)
   USB plug



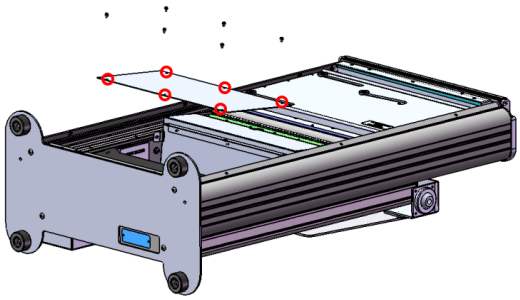
3. Remove 10 8-32 x $\frac{1}{4}$" truss screws and tooth lock washers from the back panel. There are three on each side, two on the top, two on bottom.



4. After removing the back cover, cover the cylinder slot with masking tape to prevent dust from entering the system.



5. Remove eraser plate 6 4-40 x $\frac{1}{4}$" pan head screws with washer and lock washer.



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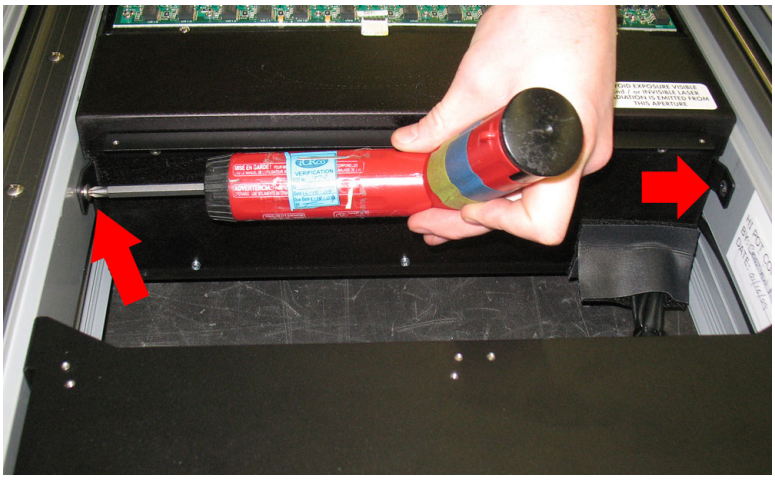
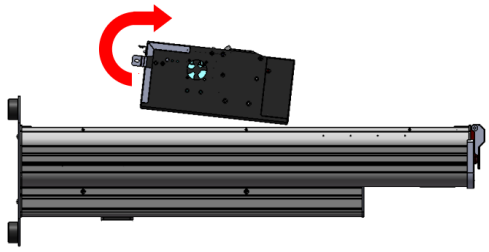
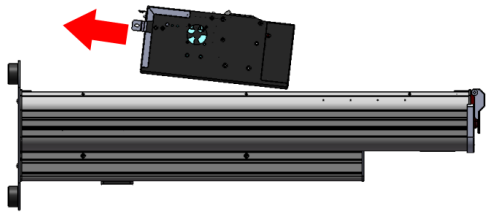
6. Remove screws holding up scan head: 2 8-32 x $\frac{1}{2}$" truss head screw with lock washer.



7. Now the scan head is free.
8. Pivot the bottom of the scan head out of the back of the VERTX.



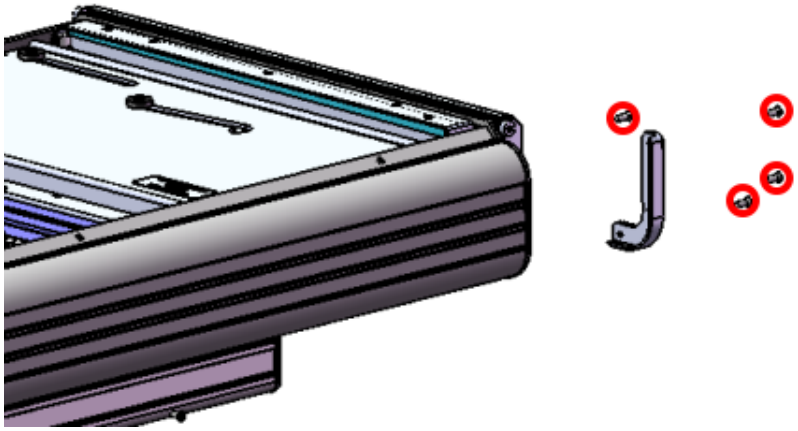
9. Slide the scan head towards the bottom of the VERTX unit, then lift out.



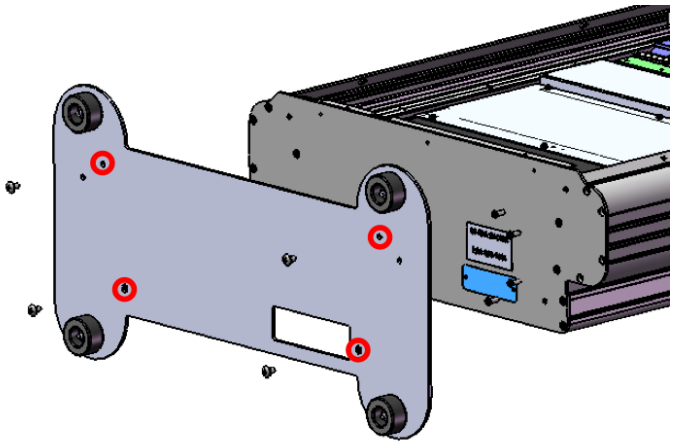
13.6 Check motor / motor drive

1. Remove the back cover, as covered in the Section 13.2.

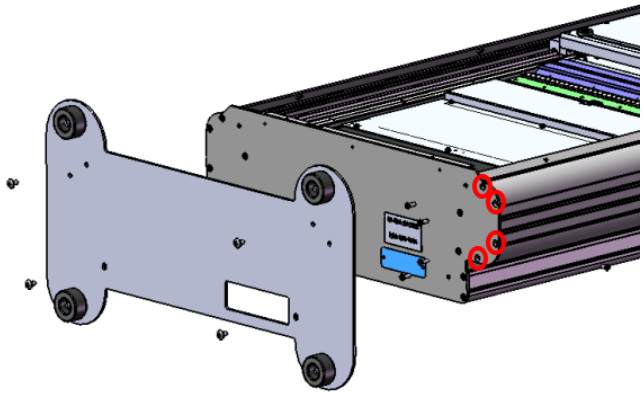
2. Remove 4 8-32 x $\frac{1}{2}$" flat head screws from the top of the top end cap. This also removes the top bumper.



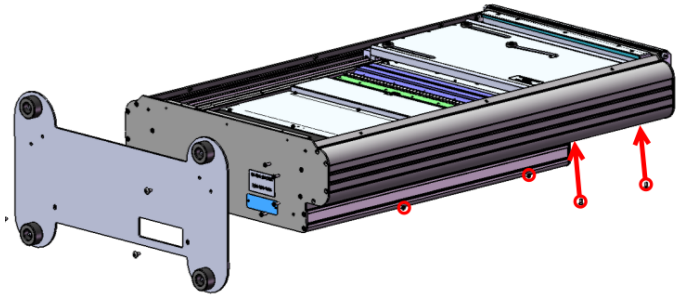
3. Remove the base plate: 4 10-32 x $\frac{3}{8}$" truss head screws.



4. Remove 4 final screws attached to shoulder extrusion.

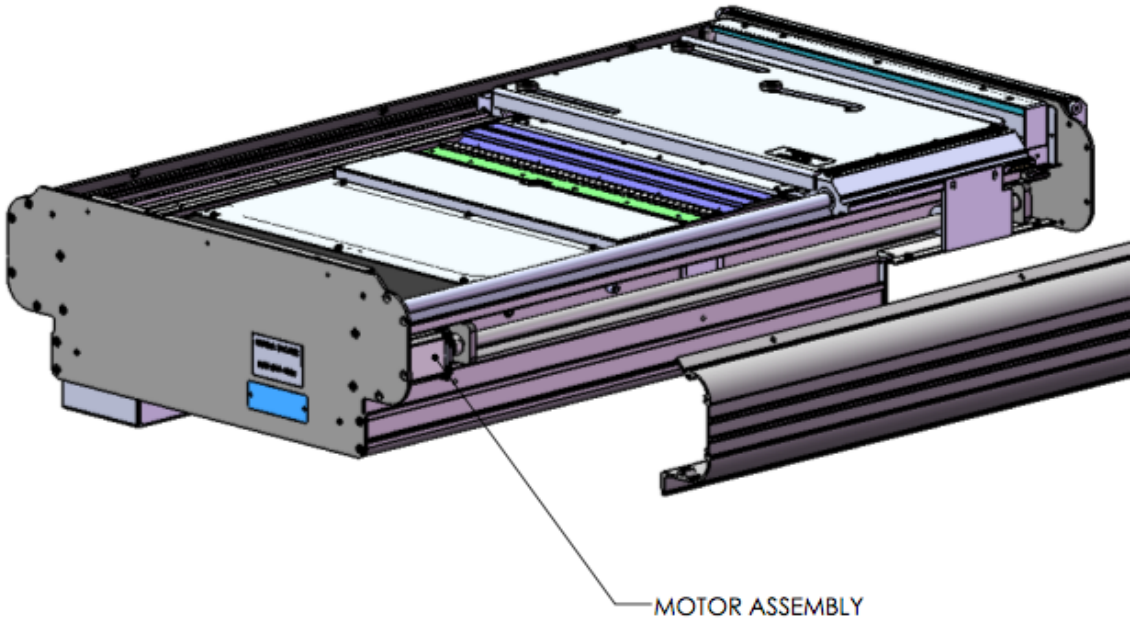


5. Remove the 4 8-32 x $\frac{3}{8}$" flat head screws along the length of the shoulder extrusion.



6. Remove the shoulder extrusion.

7. This gives you access to motor, home position sensor, & cassette motor drive system.



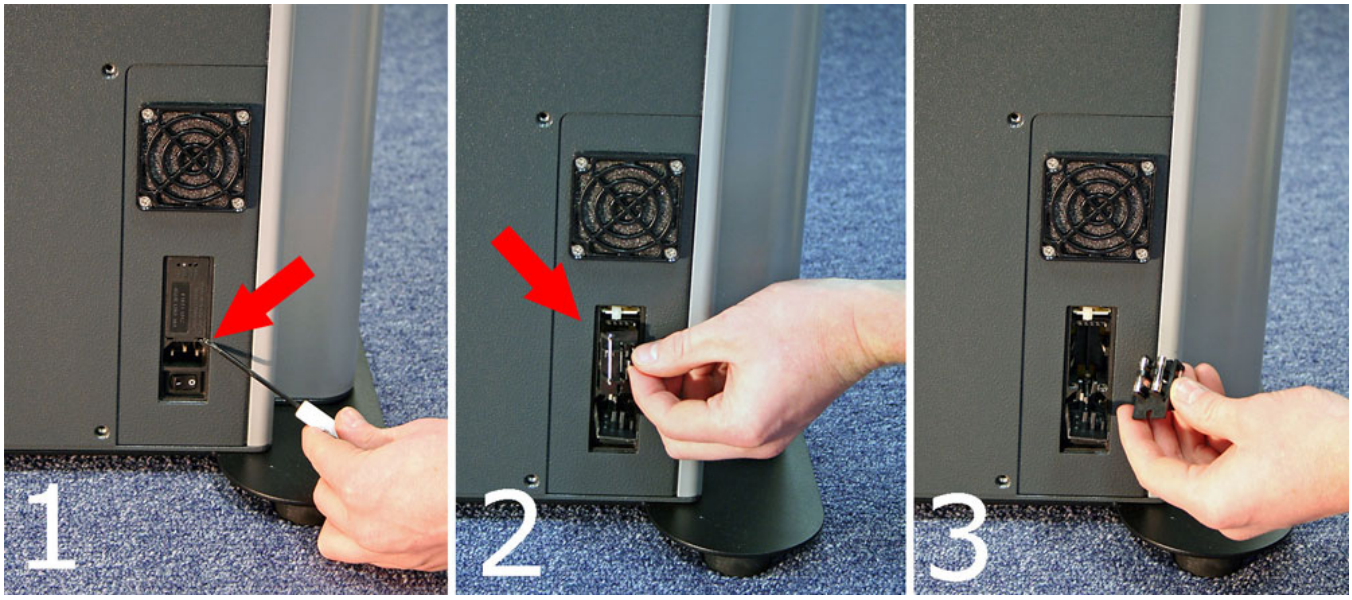
13.7 Checking the Fuses

⚠ WARNING: Make sure the VERTX unit is powered off and unplugged before removing the fuses and/or cover.

13.7.1 Power Fuses

1. With a small screwdriver, gently pry off the protective flap.
2. Gently removed the fuse housing.
3. The fuses are located on the back of the fuse housing.

4. The fuses are 3A/250V.

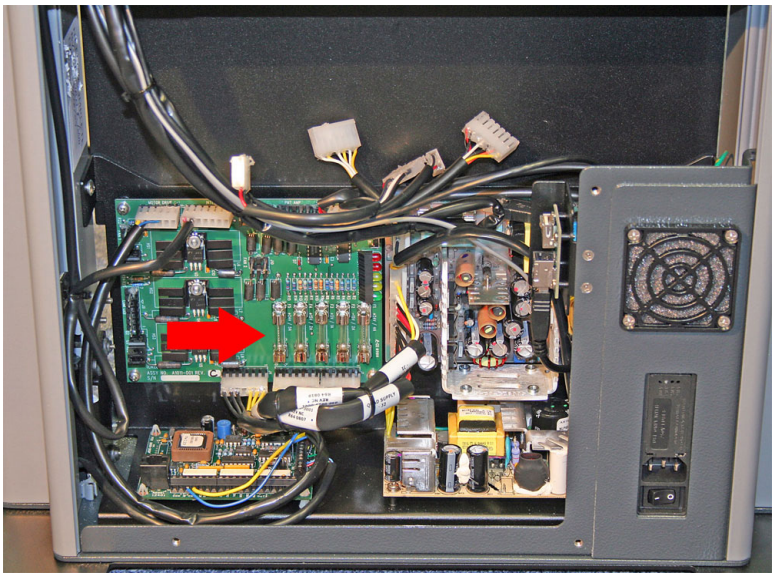


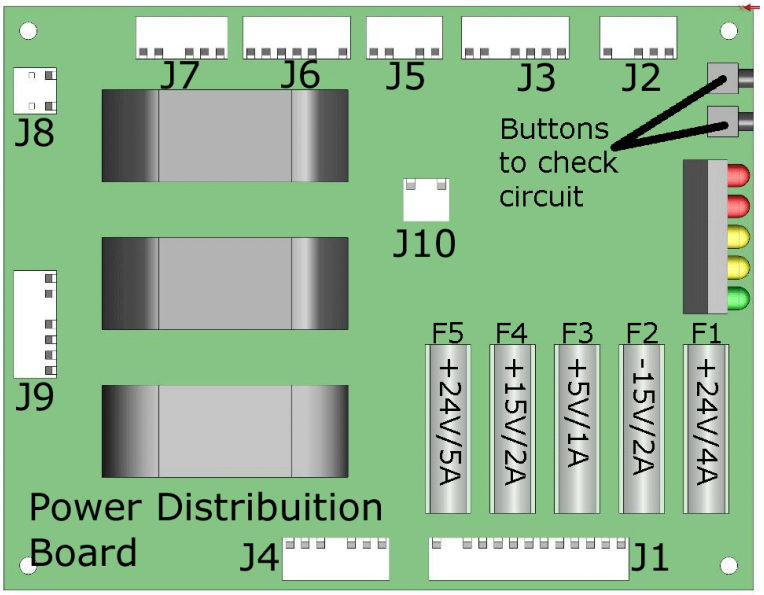
13.7.2 Power Distribution Board Fuses

⚠ WARNING: Make sure the VERTX unit is powered off and unplugged before removing the cover.

1. Remove the front cover, as covered in Section 13.1.

2. There are five fuses located on the power distribution board. Remove & check them:





13.8 PMT LF Revision E Adjustment/Test Points

1. LASER POWER
   (a) TRIMPOT R450 ‘LSP’
   (b) TEST POINT REGULATOR TAB U55
2. ZERO OFFSET
   (a) TRIMPOT R272 ‘OFS’
   (b) TEST POINT TP15 ‘VAD’
3. HIGH VOLTAGE 2
   (a) TRIMPOT R318 ‘PMT#2 BAL’
   (b) TEST POINT TP3 ‘HV2’
4. HIGH VOLTAGE 1
   (a) TRIMPOT R316 ‘PMT#1 BAL’
   (b) TEST POINT TP1 ‘HV1’
5. RAMP FREQUENCY
   (a) TRIMPOT R419
   (b) TEST POINT TP25 ‘RPO’
6. RAMP DC ZERO
   (a) TRIMPOT R470 ‘RD0’
   (b) TEST POINT TP25 ‘RPO’
7. RAMP OFFSET
   (a) TRIMPOT R367 ‘OST’
   (b) TEST POINT TP25 ‘RPO’
8. RAMP GAIN
   (a) TRIMPOT R369 ‘RGT’
   (b) TEST POINT TP25 ‘RPO’

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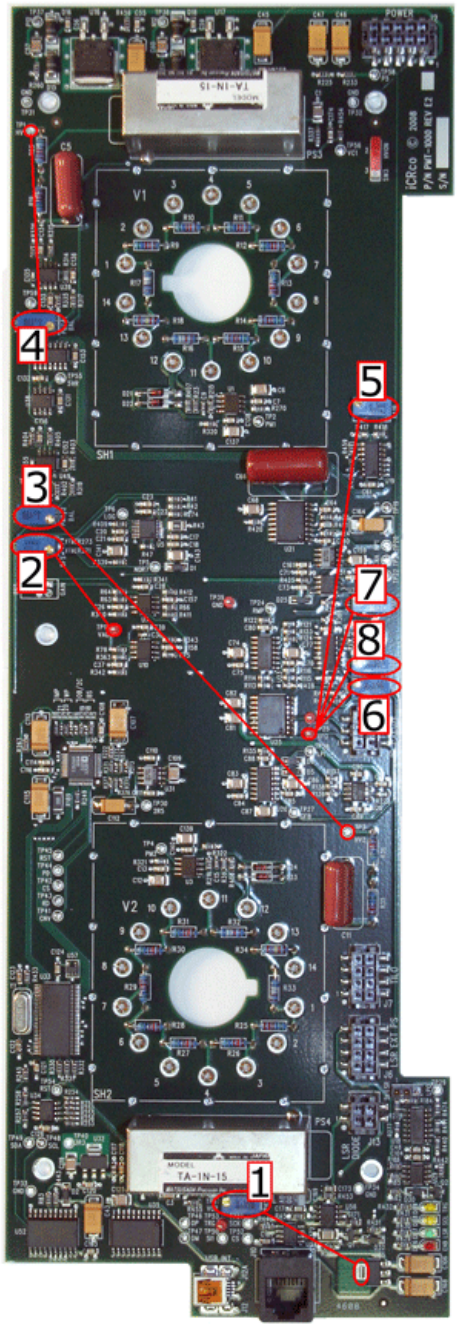
PMT Board Test Points



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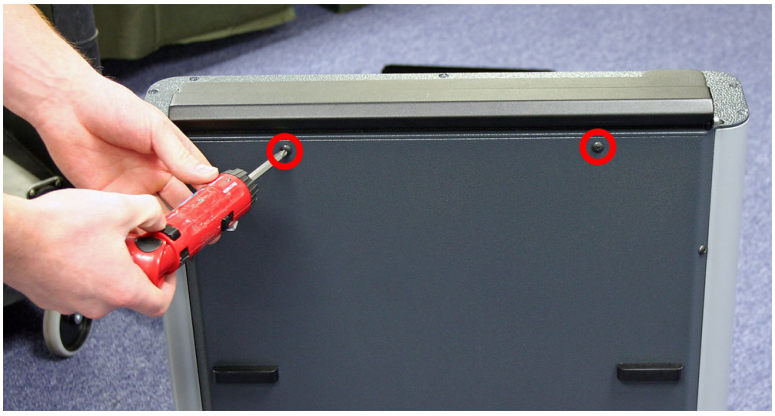
13.9 Changing the Brushes

13.9.1 Scan Slot Brushes

⚠ WARNING: Make sure the VERTX unit is powered off and unplugged before removing the cover.

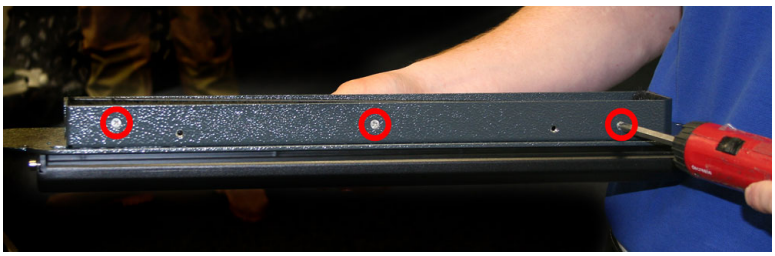
1. Remove 9 8-32 x $\frac{1}{2}$" screws from the top end cap assembly of the VERTX

2. Remove 2 8-32 x $\frac{1}{4}$" truss head screws and tooth lock washers from the back panel of the VERTX



3. Remove the top end cap assembly.

4. There are 3 6-32 $\frac{1}{4}$" flat head undercut screws holding in each brush. Remove the screws, then pull off the brush.



5. Remove any excess adhesive from the top end cap assembly.

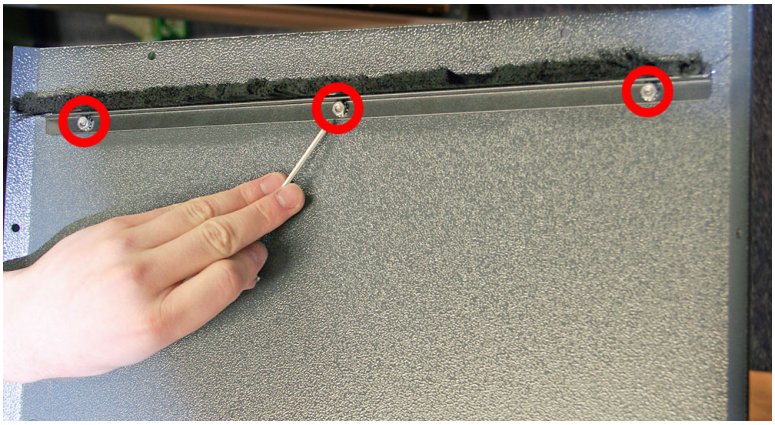
6. Apply adhesive to the ends of the new brushes, then put the brushes in place on the top end cap assembly and screw the brushes back in.

13.9.2 Back Cover Brush

⚠ WARNING: Make sure the VERTX unit is powered off and unplugged before removing the cover.

1. Remove the back cover, as covered in Section 13.2.

2. The brush is located near the top, attached to the back cover. Remove 3 6-32 kep nuts holding the brush in place.



3. Remove the excess adhesive from the back cover.

4. Apply new adhesive to the ends of the new brush. Set the brush in place.

5. Screw the brush back down.

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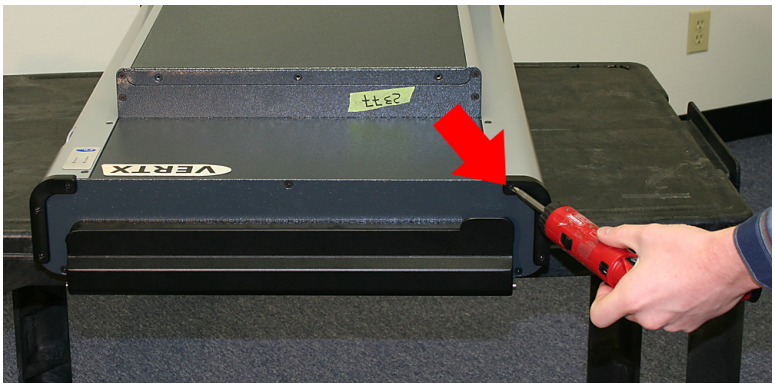
13.10 Jammed Carriage

⚠ WARNING: Make sure the VERTX unit is powered off and unplugged before removing the cover.

1. Remove the back cover, as covered in Section 13.2.
2. Orient the VERTX unit so that the unit is laying on its front.
3. Remove 4 8-32 x $\frac{1}{2}$" flat head screws from the top end cap.



4. Remove 4 8-32 x $\frac{1}{2}$" flat head screws from the base of the VERTX unit.

5. Remove 4 8-32 x $\frac{3}{8}$" flat head screws from the shoulder extrusion (it is the shoulder extrusion on the opposite side of the USB plug.)

6. Remove the shoulder extrusion.
7. Visually inspect the carriage, lead screw, motor, and motor drive for physical blockage. Remove any blockage if necessary.
8. Remove the 2 screws from the lead screw angle. The carriage should slide smoothly.
9. If there is no physical blockage, or if the carriage continues to resist moving smoothly, the VERTX unit is out of alignment. Continue:

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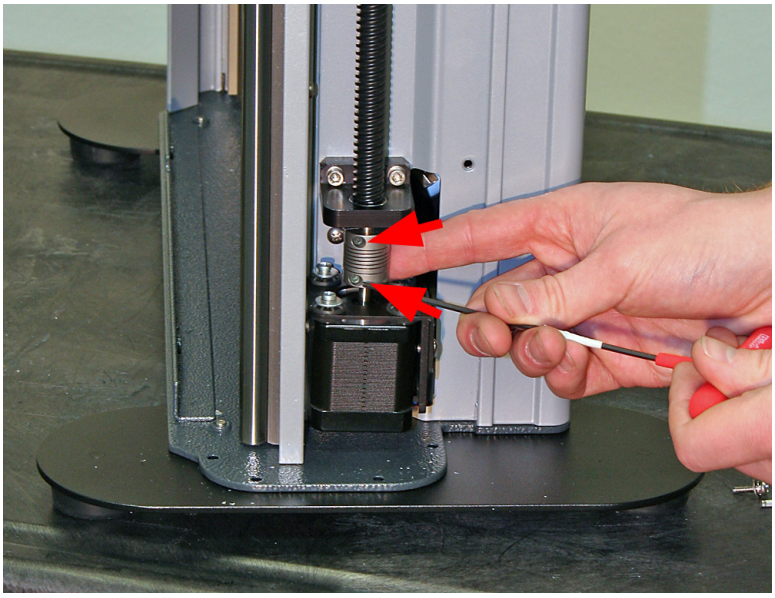
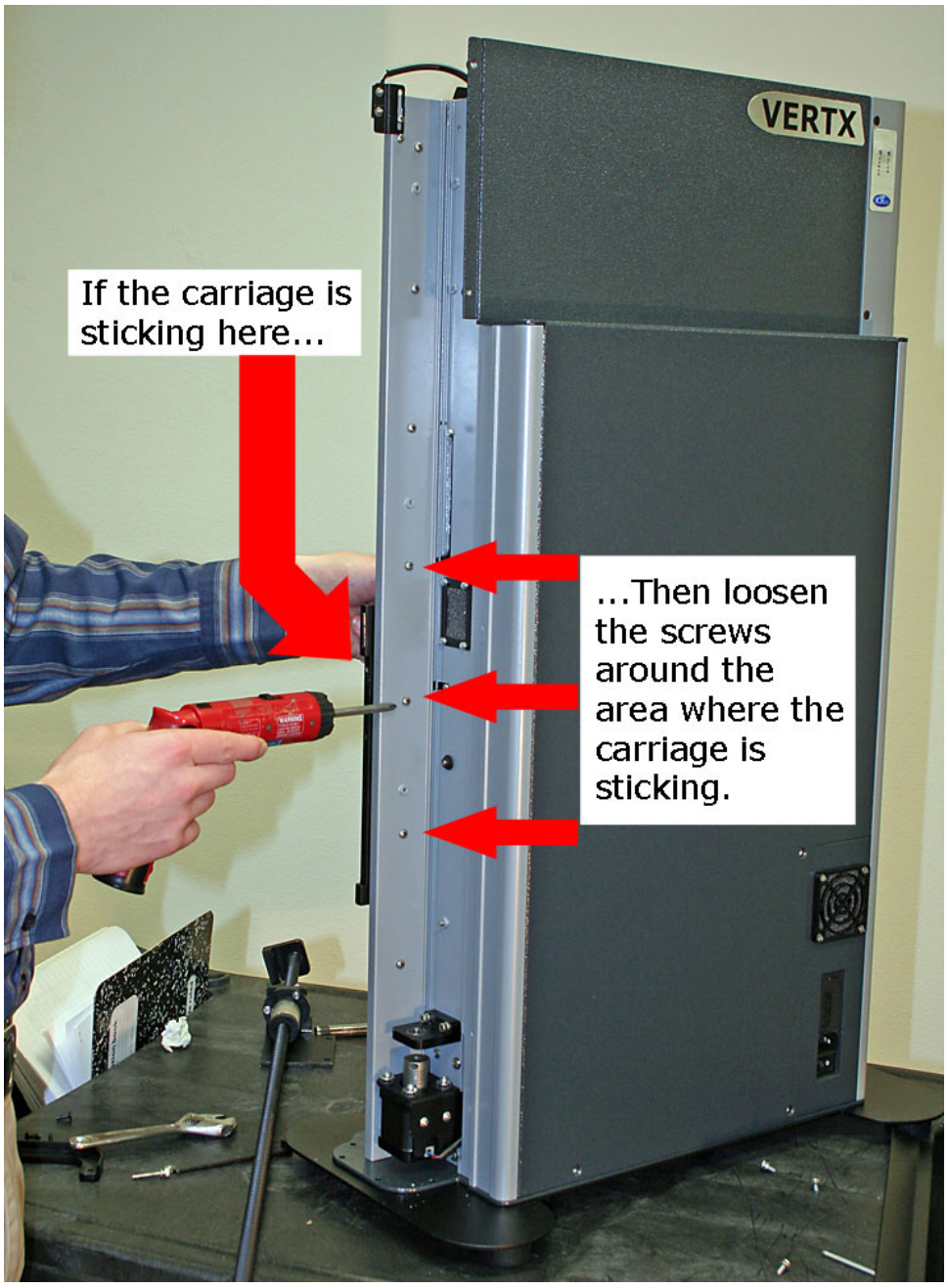
10. Loosen 2 $\frac{3}{32}$" Allen socket head screws on the motor coupling.



11. Gently pull the lead screw up, then out.
12. Note the point where the carriage is sticking.

13. Loosen the screws around the area where the carriage is sticking.



14. With minimal force, pull the carriage shaft towards the outside of the VERTX unit, and while still applying force, re-tighten the screws.

15. Check to see if the carriage moves smoothly.

16. If the carriage continues to stick, repeat the last four steps until the unit is back in alignment.

13.11 Jammed Cassette During Scan

1. Ensure that the **Stage Current (Scan)** is set to **0.5** and the **Stage Current (Return)** is set to **1.0**. To check the Stage Currents, open QPC XSCAN, bring up the Scan interface, click the **Settings** button, and enter the password *earl*. The Stage Current settings are located in the middle column, near the bottom.

2. Remove the back cover, as covered in Section 13.2

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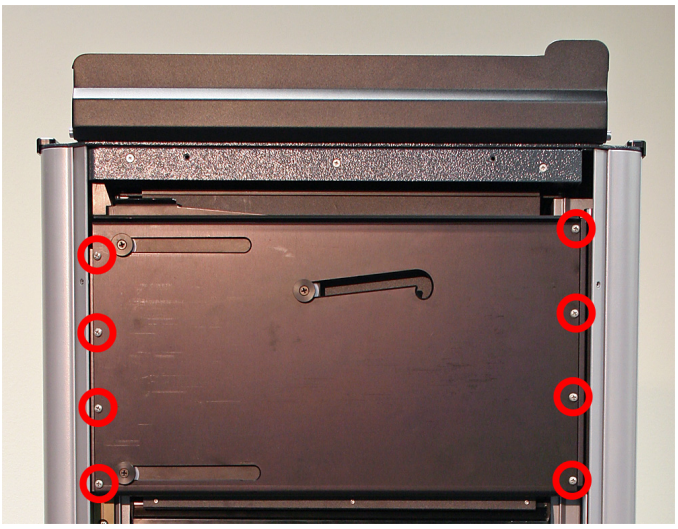
3. Remove 8 screws from the carriage. Hold the carriage with your hand before removing the last screw.



⚠ CAUTION:Do **not** allow the carriage to fall to the bottom of the machine. It could cause further damage to the VERTX unit.

4. The carriage will be loose on its rails. Make sure that is does not fall to the bottom of the machine.
5. Gently lower the carriage to the bottom of the machine.
6. Pull the carriage and cassette away from the VERTX unit.
7. Gently remove the cassette door from the top of the VERTX unit.
8. Gently remove the cassette from the carriage.
9. Slide the cassette door back into the cassette.
10. Slide the carriage back into place.
11. Screw the screws into the carriage, then replace the back cover.

13.12 Cleaning the IP Plate

To open the cassette and clean the IP plate, first remove the carbon fiber door by applying pressure to the catch, located along the side of the cassette. The carbon fiber door will then be able to slide freely out of the cassette housing. The IP plate will then be exposed. The IP plate can be cleaned with *i*CRco plate cleaner (Agfa CR Phosphor Plate Cleaner), using a soft, lint-free cloth. Spray the plate cleaner on the cloth, then gently wipe the IP

plate clean. If ***i***CRco plate cleaner is not available, use Taskmate all-purpose wipes or Kimtech Kimwipes.

⚠ CAUTION: At no time should any abrasive cleaners or chemicals be used to clean the cassette or plate, as this will void the warranty.

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14. Parts List

Lead Screw with Nut	900-0232-01	1
Shaft Support Rail	900-0242-01	1
1/2″ Shaft	900-0241-01	1
10mm Guide Rail	100-0867-02	1
Magnet Switch Harness	040-0013-0001	1
Fan	900-0061-01	1
Fan Filter Assembly	900-0061-03	1
USB Adapter Mount	100-0952-01	1
USB Board	500-0114-01	1
Magnet Switch Bracket	100-0682-03	1
Fan Filter Inner	100-0853-01	1
Fan Filter Inner Cover	100-0853-02	1
Lead Screw to Pillow Block Angle	100-0691-05	1
Angle Extrusion Stiffener	100-0873-01	1
1m USB Cable	900-0168-04	1
Cable Clips	900-0265-01	3
Hi-Pot Sticker	090-1008	1
Bottom End Cap Assembly	500-0183-01	1
Bottom End Cap Weldment	100-0883-01	1
Serial Number	100-0269-01	1
Pop Rivet		2
Front Angle Weldment	100-0882-01	1
Bearing Mount Assembly	500-0188-01	2
Bearing Mount	100-0695-01	1
Roller Bearing	900-0230-01	1
Motor Assembly	500-0189-01	1
Grommet Motor Bracket	100-0681-07	1
Motor Coupling	100-0855-01	1
VERTX Motor	900-0034-02	1
Motor Grommet	900-0256-01	4
Motor/Grommet Standoff	900-0262-01	4
Motor/Grommet Washer	900-0263-01	4
Electronics Plate Assembly	500-0192-01	1
Electronics Plate	100-0676-01	1
Power Distribution Board	500-0034-02	1
Quad Power Supply	900-0028	1
Eraser Power Supply	900-0029	1
Motor Controller	900-0030	1

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Nylon Spacer Mounts	900-0013	4
Carriage Assembly	500-0191-01	1
Pillow Block Assembly	500-0196-01	1
Pillow Block Extrusion	100-0852-03	1
Magnet	900-0007	1
4-40 x 7/16″ Flat Head Screws		2
1/2″ Open Bearing	900-0240-01	2
Push Rod Assembly	500-0190-01	1
Push Rod Holder	100-0851-01	1
Push Rod	900-0231-01	1
Delrin Shoulder Washer	100-0699-02	3
Slide Plate	100-0684-01	1
Nylon Washer	900-0243-01	3
Cassette Entry Rail	100-0850-01	1
Path Plate	100-0683-02	1
Laser Warning Sticker	090-1007	1
Hat Section Bar	100-0897-01	1
10mm Profile Rail Carriage, LLY	100-0868-01	2
8-32 x 3/8″ Black Flat Head Screws		3
6-32 x 1/2″ Pan Head with Washer/Lock		8
USB/LED Assembly	500-0195-01	1
USB Board	500-0114-01	1
LED Harness	040-0014-0011	1
USB/LED Bracket	100-0685-01	1
USB Mount	100-0857-01	1
Bezel Assembly	500-0193-01	1
Bezel Plate	100-0688-04	1
Magnets	900-0007	13
2-56 x 3/16 Socket Cap Screw		3
Bezel Stiffener	100-0973-01	1
Bezel Blocks	100-0974-01	2
Bezel Edge Molding	100-0975-01	1
Bezel Overlay	100-0976-01	1
Machined Bezel Angle Mount	100-0977-02	2
Scan Head Assembly	500-0162-01	1
Scan Head Base	100-0749-01	1
Galvo Side Cover	100-0769-04	1
Return Mirror Side cover	100-0774-03	1
Bottom Cover	100-0782-03	1
PMT Cover	100-0772-01	1

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Anti Jitter Bracket	100-0824-03	1
End Cap, Cylinder	100-0770-01	2
Machined Scan Head Cylinder, PMT Side	100-0744-01	1
Machined Scan Head Cylinder, Blank Side	100-0745-01	1
Machined Heat Sink Extrusion	100-0805-01	1
Molded PMT Block	100-0775-03	2
Cambridge Galvo & Controller	900-0192-01	1
PMT 1000 Board	500-0037-01	1
Anti Jitter Board	500-0051-01	1
Eraser Board	500-0052-01	1
USB Cable - USB A to USB B-Mini	900-0168-01	1
PMT Gasket	100-0330-04	2
Eraser Plate Angle	100-0886-02	1
3/8" Caterpillar Brush	900-0078-04	1
Tab, Left Side	100-0690-01	1
Tab, Right Side	100-0690-02	1
Captive Pin, .25" Diameter	900-0222-01	2
PMT Assembly	500-0018-01	2
PMT Tube	900-0009-01	1
Purple Filter	100-0150-01	1
Heat Shrink Tubing	900-0161-01	4
Long Mirror Assembly	500-0161-01	1
Long Mirror Mount	100-0768-01	2
Long Mirror Clamp	100-0812-02	2
Long Mirror	100-0802-01	1
Rubber Mounts	900-0224-01	2
Grounding Wire	040-0018-0001	2
Copper Tape	900-0101	6"
H-Bracket Assembly	500-0160-01	1
Galvo Mount	100-0743-01	1
Galvo Clamp	100-0746-01	1
H-Bracket Laser Side Plate	100-0777-01	1
H-Bracket Side Plate	100-0778-01	1
Adjustable Mirror Base	100-0807-01	1
Fine Adjustment Screw, 1/4-80	900-0042-02	1
Small Stationary Mirror Assembly	500-0159-01	1
Stationary Mirror Mount	100-0783-01	1
3mm Small Mirror	100-0804-02	1
Mirror Clamp, H-Bracket	100-0779-01	2
Rubber Mounts	900-0224-01	4

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Turning Mirror Assembly	500-0158-01	1
Adjustable Mirror Mount	100-0785-01	1
Adjustable Mirror, Middle Mount	100-0885-01	1
Side Spring, Adjustable Mirror	100-0210-01	2
Top Spring, Adjustable Mirror	100-0211-01	1
3mm Small Mirror	100-0804-02	1
Mirror Clamp, H-Bracket	100-0779-01	2
Rubber Mounts	900-0224-01	4
Fine Adjustment Screw, 1/4-80	900-0042-02	1
Return Mirror Assembly	500-0163-01	1
Return Mirror Mount	100-0747-01	2
Return Mirror Clamp	100-0812-03	2
Return Mirror	100-0802-02	1
Rubber Mounts	900-0224-01	2
Grounding Wire	040-0018-0001	2
Copper Tape	900-0101	3”
VERTX Laser Assembly	500-0086-04	1
Beam Expander Mount, VERTX	100-0390-02	1
Locking Nut	100-0392-01	1
Laser Diode Mount	100-0393-01	1
Laser Diode Nut	100-0394-01	1
Laser Diode Cap	100-0395-01	1
Focusing Lens Locking Ring	100-0668-02	1
Focusing Lens Assembly	500-0087-03	1
Laser Diode, 658nm 50mW	900-0186	1
Laser Diode Socket	900-0187	1
Heat Sink Compound		As Needed

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